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This description of programs dealing with gifted elementary school children covers in its scope the definition, imagination, enrichment, responsibility and treatment of the ablest student. The established programs of grade skipping, gradeless schools, grouping by ability, and enrichment are described along with examples of new methods of teaching mathematics and reading to students of various abilities. Suggestions are made to encourage the children's enthusiasm and depth in mathematics. The search for giftedness has been found to be much more beneficial than the search for the gifted child. Students are challenged regardless of their ability level.

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IMAGINATIVE TEACHING IN ELEMENTARY SCHOOLS

A DESCRIPTION OF PROGRAMS DEALING WITH GIFTED CHILDREN

ED0013372

By

DAVID MALLERY

Foreword by

EDWARD YEOMANS

NAIS

NATIONAL ASSOCIATION OF INDEPENDENT SCHOOLS

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This monograph is No. 5 in a series of studies initiated by the Committee on Educational Practices of the National Council of Independent Schools and now continued under the direction of its successor, the Committee on Research of the National Association of Independent Schools. The author, David Mallery, formerly a teacher of English at Germantown Friends School, is director of studies for the Committee. His is also the author of New Approaches in Education, *published by the National Council of Independent Schools in March, 1961, and of* High School Students Speak Out, *a study done under the auspices of the Educational Records Bureau, published by Harper and Brothers in April, 1962.*

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IMAGINATIVE TEACHING IN ELEMENTARY SCHOOLS

A DESCRIPTION OF PROGRAMS DEALING WITH GIFTED CHILDREN

By

DAVID MALLERY

Foreword by

EDWARD YEOMANS

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PART I

FOREWORD

IT IS NORMAL FOR CHILDREN TO THINK

By EDWARD YEOMANS

Former Director, Shady Hill School,
and currently Peace Corps Training Officer, Puerto Rico

This report is designed to be a companion-piece to the study of advanced placement courses in secondary schools, published in 1958 by the National Council of Independent Schools. That study pointed out, among other things, that the growing practice of advanced placement for able students not only up-graded the whole experience in secondary school for these students but tended to improve the teaching in the other courses as well, to the end that all the students benefited.

Advanced placement as such is not as applicable to the elementary school as it is to secondary schools and colleges, although many schools are now using some form of the "two-track" curriculum at the junior high school level, and this can lead readily to advanced placement in the senior high school years. Nevertheless, elementary schools in one way or another are attempting to do something about their most able students, for we seem at last to have reached a period in our history when superior intellectual, artistic or other specific ability merits a high priority in our scale of educational responsibilities. John Hersey's indictment in *The Child Buyer* of schools which fail to recognize genius when they have it in their midst bespeaks a growing realization that society cannot afford to waste its talents.

It therefore seems timely to examine some of the plans that are in use in various schools in the hope that these plans will encourage the faculties of other schools who are still in doubt about how to proceed. Not that there is any simple formula for the best way to group and to teach those students in the elementary grades who are commonly referred to as being gifted. For one thing, a given child may have outstanding aptitude and skill in one subject and may be average in the others. For another, dramatic changes can take place during the ele-

mentary years, and latent interests may be discovered which will change the total learning pattern of the student.

A Look at Recent Efforts for the Gifted

A great deal has been written about gifted students, most of it since 1950. The most comprehensive study is also one of the earliest: that of Lewis Terman, who kept exhaustive records on one thousand gifted children in California and kept in touch with these individuals over a period of forty years. The report of his study, published by the Stanford University Press under the title, *Genetic Studies of Genius,* became the foundation upon which many other investigations were built. And these later investigations, in turn, have led to numerous experiments in established schools, to new schools devoted to the specialized teaching of gifted students, and to associations for making further studies.

One of the best general reviews is that of Havighurst, Stivers and De Haan: *A Survey of the Education of Gifted Children.*[1] Various criteria of giftedness are described, together with summaries of special courses, projects and grouping arrangements that have been used in public and private schools throughout the country.

One of the schools that is organized specifically for gifted children is the Hunter College Elementary School in New York. No student who scores below 130 on a Stanford Binet is accepted at this public school. The curricula, teaching methods, parent relationships and achievement of the students are described in *Educating Gifted Children* by Gertrude H. Hildreth.[2]

A more recently developed school for gifted students is the City and Country School of Bloomfield Hills, Michigan. Bulletins published by the school go into considerable detail in reporting classroom work at each grade level, and aspects of this school's program are described in this study (Part V).

Among the large-scale efforts in public school systems is that of Portland, Oregon, described in *The Gifted Child in Portland,* available from the office of the Portland, Oregon, Superintendent of Schools. This study is particularly interesting because of the wide variety of criteria used in identifying gifted children, and because of the methods of collaboration with the faculty of Reed College for providing special courses for many of the children thus selected.

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[1]University of Chicago Press, 1955.
[2]Harper, 1952.

Some of the most competent studies of gifted children as they appear in the home, school and community have been compiled by Paul Witty in *The Gifted Child,*[3] which includes an excellent bibliography. The National Education Association has published a series of curriculum suggestions for "academically talented" students in each major subject. Written for parents, but of much value to teachers, is *Helping Your Gifted Child* by Ruth Strang.[4] Finally, the bulletins of the American Association for Gifted Children carry reviews of recent studies and reports of conferences.

It is not our purpose in this report to summarize the literature in this interesting field, any more than to suggest that the books mentioned would make a good addition to a school's professional library, and that they would stimulate some valuable faculty discussions. Obviously, whatever a school decides to do about improving the opportunities for its gifted students must grow out of the basic educational philosophy of that school and cannot be superimposed by external or internal pressure, no matter how well-intentioned. One danger of the times is that "crash programs" for the special education of gifted students are becoming popular and may develop more rapidly than the supply of competent teachers, or than our understanding of what should be taught, and how.

What Is a Gifted Student?

There is a wide range in the definitions of a gifted student in the elementary grades. Some schools define a gifted student as anyone who achieves a score of 115 or more on a group intelligence test; others range upward as high as a minimum of 140, based upon either individual or group tests. Many, but not all, include the student's social and artistic maturity and physical coordination in their criteria of giftedness. Most attach considerable importance to the student's daily achievement in various school subjects as well as to the scores on aptitude and personality tests.

We are still a long way from having any basic criteria or definition of the gifted student, and perhaps this is just as well, for if every elementary school decides to do something about that portion of its student-body which it considers to be gifted in some respects (using its own criteria), much good will be accomplished. There are rare cases in which a child is developing at a much more rapid rate in every respect than are the others in his age group, but most children are apt to mature somewhat unevenly and at different rates. This fact calls for flexibility both in the definition and in the teaching of gifted students.

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[3]D. C. Heath, 1951.
[4]E. P. Dutton, 1960.

Gifted Children and "The Others"

The theme of this report is—not unlike that of its predecessor—that whatever is done by a school to up-grade the opportunities for its ablest students will not only benefit those students but will benefit all of the others as well. Or, to put it another way, the kind of education that is needed for gifted students in the elementary grades is also needed by all normal students. There will be need for differences in tempo and emphasis, but there should be no less respect for the potential capacity of the average student merely because he is average at this time in his life.

Obviously we cannot expect all students to learn as quickly, think as clearly, appreciate as readily or accomplish as much as do the gifted students in our classes. As Terman pointed out many years ago, the students who have very superior aptitude tend to be superior in everything, including physical coordination and emotional stability. These students are a pleasure to teach and are apt to lull a teacher into believing that his teaching is responsible for their outstanding achievement when actually they are educating themselves—with his help, to be sure. The test of good teaching is the ability to awaken average students to the joy of learning so that they can develop according to their own potentialities such gifts as others inherit or acquire in infancy. From this it follows that the skills, background and methods that succeed in the teaching of gifted students are all the more necessary for the teaching of average students, unless we assume that average students must become average adults who can never realize more than average success or make more than an average contribution to their society.

The Standard Approaches

The time-honored methods that have been employed by elementary schools for dealing with their gifted students, at least with those whose gifts are academic, are well-known to all teachers: a student either skips a grade or he is kept with his age-group and the standard courses are "enriched" for his benefit. It has been much harder to know what to do with students whose gifts are of a musical, artistic or reflective nature and who fail to exhibit the particular accomplishments that are rewarded by admission to preparatory schools and colleges. Grade-skipping has undoubtedly been successful in some cases, especially when the student is mature beyond his years and can hold his own with older students in physical and social activities as well as intellectual ones. There are, however, individuals known to every elementary school who should not have been pushed ahead, who were too young to profit fully from

secondary school and college and who, as adults, rebuke their elementary schools for having allowed this to happen.

Suffice it to say that the decision to promote a student into a grade whose median age is two or three years older than he is is a complicated one and should only be made with the most expert professional advice. Furthermore, one is tempted to ask whether a year of learning which can be skipped successfully by a superior student is challenging enough for the others who take it.

A growing number of schools are trying out various alternatives to grade-skipping which take into consideration the uneven development of abilities, so often found in children in the primary grades. "Individualized reading" is being used in some schools to supplement the usual graded readers in order to permit rapid learners to read books on their own level of interest and difficulty. This method of teaching reading, when supported by regular use of a good school library, tends greatly to broaden the spectrum of accomplishment in reading without separating the able students from their age-group and from their proper placement in other school subjects. The section on the Cabot School's second grade reading program in this study (Part IV) illustrates a method of setting up and carrying out this type of reading program in the primary grades.

The "Ungraded Plan"

Increasingly widespread use is being made of the so-called "ungraded plan" in order to provide even greater flexibility of placement within the elementary school. The best study of this subject is *The Non-Graded Elementary School* by Goodlad and Anderson.[5] The experience with ungraded elementary schools in Grosse Pointe, Michigan, and in Appleton, Wisconsin, indicates that there is great value in this method of progression for the most able and the less able alike.

While the techniques differ somewhat in the various schools that are using it, the basic pattern is the same: instead of following the usual sequence of first, second and third grades in which a given student takes all of his work, he may take his mathematics in a room with children who are a year older than he, and may take his reading and other subjects in his regular home-room. Or if his reading is giving him trouble, he could read with a younger class and still hold his place with his age-group in the other subjects.

By eliminating the designations, first, second and third grades, and substituting the name of the teacher in charge of each room, it is easier

[5]Harcourt, Brace & Company, 1959.

to break the lock step of progression from year to year, to assign individuals to "courses" that are suitable for their ability and thereby to accommodate a much wider range of achievement within a given age-group than is apt to be possible under the conventional plan. Furthermore, while most children will complete the span of the elementary grades in nine years (Kindergarten through VIII), some will require ten. This they can do without the onus, or the fact, of repeating a grade, with all of the psychological implications that surround that experience. A few may complete the sequence in eight years without the abrupt dislocation of skipping a grade.

Clearly, the impact of the ungraded elementary school will be felt upon the subsequent grades of the junior high school. There will be a wider range of achievement within each group than we have been accustomed to. But it will be an upward range, with able students ready to do more advanced work because they have not been held down to the median level, and less able students being relatively free of the self-doubt and discouragement that so often follow in the wake of failure and repetition. This is certainly in the interests of gifted children. It is also in the interests of those who are average.

While providing greater academic flexibility, a well-run non-graded elementary school maintains the value of a home-room and the identification with a home-room teacher. There is general agreement on the importance of this experience for most children in the elementary grades. To departmentalize all the subjects in the interests of flexibility would be to eliminate the continuity of association with a person and a group. Specialized teaching has an important place in the elementary school, but it should supplement, and not replace, the home-room and the home-room teacher.

The Two-Track Plan

The "two-track" plan is another device that has met with a good deal of success, especially in the upper, more departmentalized grades of elementary schools. The A and B sections in each subject represent respectively advanced and normal progress within a given subject such as mathematics or language. Sometimes there is a C section as well, for the plodders. This plan has the advantage of allowing gifted students to stay with their age group and still have work that is commensurate with their abilities. It is also good for average students to begin to feel successful in a curriculum that is designed for them, rather than always

being out-distanced by the rapid learners in a combined classroom. In a small school this plan is expensive and difficult to schedule. In large school systems it lends itself well to team-teaching and other efforts to break the lock step of the old-style elementary school. This study's description of the Eaglebrook School's sectioning policy (Part III) is a good example of the application of this plan to the elementary grades.

Enrichment

"Enrichment" is a more common device for providing greater opportunities for gifted students. By this is meant the assignment of extra work, special topics or projects related to the normal work of the class, or activities such as debating clubs, a newspaper, or a piece of work in laboratory, shop or studio that may have no bearing whatever upon the work of the class. Sometimes the gifted students work on their own, sometimes in clubs, sometimes in special classes taught by teachers having special competence.

The reports of various programs designed for gifted students are full of ideas for enrichment. They range all the way from a description of the year's work in each grade found in Hildreth's book on Hunter College Elementary School to the detailed recommendations, subject-by-subject, found in the National Education Association reports. Many of them are excellent and should be examined, discussed in faculty meetings and tried out by schools looking for ideas. Others seem trite and lacking either in imagination or in respect for the abilities of able students. Or perhaps they merely reflect a difference in definitions of giftedness. Each school will have to use its own judgment in deciding what is relevant to its particular needs.

If one or two comments are in order on the examples of enrichment which are widely used, as reported in the studies, they would be the following:

1. There is a tendency to confuse the *application* of a subject like arithmetic, with enrichment. Students who are quick at arithmetic are often given something practical to do like running a store, when what they should have is more arithmetic and mathematics. The store is really more appropriate for the slow ones who need the experience of concreteness in order to make their concepts more secure. The able ones get pleasure from their ability to solve problems with abstract symbols, and they should be allowed to go as far as they can.

2. Special projects such as visits to factories, newspaper plants and other institutions in the community are often recommended for gifted students. This seems to be a confusion of educational values, for those students who are more literal—hence less gifted, according to some definitions—could profit just as much from the experience. Their reports of the visit would be briefer, but perhaps no less perceptive, and they could make a useful contribution to the total findings of the class. The gifted students could understand the more subtle aspects of their visit perhaps, such as the effects of automation in industry, but this is not a good enough reason to omit the others from the experience.

3. Many of the examples of "enrichment" seem so useful and valuable for all normal children that one wonders about the poverty of the teaching in the "normal" classes. While it is a step ahead to do something extra for the ablest students in a class, it is not a very significant step if all of the students could profit by those experiences, but not all are getting them.

New Concepts of How Learning Takes Place

We are learning more about the development of the learning capacities of young children from such students of the subject as Jean Piaget and Barbell Inhelder. If, as now seems clear, our elementary schools have underestimated the capacity of children to learn conceptually, whether in mathematics, science, language or social studies, as Jerome Bruner points out in *The Process of Education,*[6] then we will have to change our concepts of the kind of curriculum that is "right" for each grade, we shall need completely new kinds of textbooks, and our methods of standardized testing will have to be revised. How, then, will we know what should be the normal curriculum and what the enriched, when we are finding that considerable segments of both have tended to retard learning?

For example, a normal third grade class which has been taught mathematics with the help of Cuisenaire rods or other "embodiments" of quantitative relationships is able to solve problems involving fractions, squares, cubes, factors and products. A fifth grade class finds no difficulty in understanding the binary system and in devising a com-

[6]Harvard University Press, 1960.

puter to illustrate the principle. Plane and solid geometry, taught on an intuitive basis to be sure, hold no more difficulties than linear measure in these grades, and the commutative, distributive and associative laws of multiplication can be "discovered" and applied intelligently to the solution of problems.

There is reason to believe that the large number of adults who say they "never could understand mathematics" built up a strong mind-set against a subject which offered nothing but the mastery of multiplication tables and a rule for the inversion of a fraction when dividing, and which failed to challenge, as mathematics surely can, their real powers of reason and inquiry, while in their other subjects they were studying the Spanish conquests or the Western pioneers or the life-cycle of the frog—all of which had for them more meaning, more relation to life, and more challenge to their intellectual curiosity and powers of reasoning. The mathematics program in the Miquon School, described in this study (Part II), puts to work all of the curiosity, inventiveness and sense of order and beauty that is natural in young children. This is another way of saying that it represents meaning and life to them.

As we bring life to mathematics, and more of it to the other subjects in the elementary school, we will not only find it harder to decide what should be normal in the curriculum and what enriched for the benefit of gifted students, but we will find a surprisingly increased proportion of our classes learning as only the gifted ones learned before we made the change. Before that time comes, we shall need to prepare for it by training teachers to cope with the more-nearly-realized potentials of young children.

If we should eventually find that other areas of our curriculum are as unsuited to the real capacities of children as our conventional mathematics curriculum now appears to be, the implications are far-reaching and somewhat staggering. Among others is the possibility that in failing to enlist the child's full power in intellectual activity, we are forcing him to get his satisfactions out of external rewards: symbols of success such as grades, approval of adults, or envy of peers, rather than from the intrinsic pleasure in learning and problem-solving. Those who learn to acquire these symbols may become some of our outstanding achievers who test well and out-perform the others in the restricted accomplishments that we consider to be necessary for college preparation, while among the others may be some who are too honest to accept these substitutes for learning, who are genuinely curious and thoughtful, who see too many alternatives to answer a true-false question correctly, and who begin to rebel at the system and become marginal students.

These differences in what we might call mode of learning are well

known to every teacher and show little or no correlation with basic intelligence, but they get lost under the weight of "aptitude" and "achievement" scores. This is not to suggest that real gifts and talents are necessarily based upon superficial motivation, or that the least able are somehow the most virtuous; it is merely to suggest that as we make decisions about the identification of gifted students we examine again the material that we are teaching and the kinds of learning that we are rewarding.

Creativity

Finally, it must be said that the quality of creativity is still the most elusive to identify, the most difficult to sustain and the most needed by scientists and humanists alike, not to mention artists or musicians. It is the ability to perceive an emerging order of events or of data that leads to a predictive guess and eventually to a generalized law. It is the intuitive "feel" of a relationship, a rhythm, a design of the whole, encompassing the parts. It is a first cousin to play, but it stems from discipline too.

People gifted in this respect are those upon whom civilization depends, and has always depended, for its enlightenment and survival. It would seem that this quality should be of utmost concern to education, and that students who possess it should be entitled to unlimited encouragement.

Ironically, there is much more of it in the kindergarten than in the high school, and more in the third grade than in the seventh. We need to know more than we now do about what our culture—including our schools—does to suppress creative thinking. The gifts needed at present for promotion through school and admission to college may be of quite a different order from those needed by society for its fundamental improvement.

The truly creative individual has never had an easy row to hoe in our system of education, but these days he is more beleaguered than ever by objective tests, competitive learning and standardized expectations. It would be a loss which we can ill afford if, in our zeal to discover and reward academic merit, we also succeed in still further discouraging creative talent. When we have clearer answers to these questions we shall be able to plan more intelligently for the education not only of our gifted students but of all students, and at all levels.

The following descriptions are designed to illustrate a variety of approaches to the problem of teaching gifted students in the elementary

grades. Whatever their differences in emphasis, in philosophy, in type of school, they have in common a good measure of proven success, which has led them well beyond the experimental stage into accepted practice in their respective schools. They also have in common an assumption that there are many kinds of gifts among children in the elementary grades and that schools must become more flexible in order to teach successfully to this variety.

PART II

"EUREKA! I FOUND IT!"

> "Mathematics can give a new way of looking at the world. We are trying to give clues to new ways of perceiving the world. A child's intellectual excitement can really be like Archimedes' feeling when he said, 'Eureka, I found it!' "

The teacher of the mathematics program at the Miquon School[1] was talking about the class I had just seen. There had been plenty of the "Eureka" spirit in that class. Four sixth graders had been having a voluntary session with the teacher, clearly an encounter with some of the actual substance of analytical geometry. What had been striking to see, however, was the way these four sixth graders had explored, experimented, played detective with actual shapes and images.

I asked the teacher, "If these students are all this powerful, what would happen if you put an old style college analytical geometry textbook into their hands?"

She laughed: "For one thing, they'd get lost in the words. Then they'd get bored. In the old verbal approach to analytical geometry, the student was given rules. What we just did today did not get into words *about* the numbers. We're not seeking a substitute for traditional analytic geometry. I do think, though, that when the students get to the formal study of analytical geometry, they will bring to it images—and flexibility —a sense of the secret behind it all. When they see the formal material on the board, the chalk marks will speak to them and become meaningful tools for their thinking."

What I had seen was a sense of real mathematical excitement. The students seemed to be doing a kind of research on their own. It was clear evidence of what the school had described in a statement which had attracted me to visit its mathematics program:

> "Children, if they are not distracted by emotional disturbance and ill health, very naturally want and try to put

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[1]Miquon School, Miquon, Pa., Donald Rasmussen, Principal. A co-educational day school, nursery, kindergarten through grade six. 70 boys, 79 girls. Faculty: full-time 9, part-time 8. Teacher in charge of the mathematics program described in this section: Mrs. Lore Rasmussen.

order into life. They create and need the tools by which they order the myriad of things they see, hear and feel."

"We are trying to set up actual experiences of discovery," the teacher explained to me. "What counts is not test results but the experience of varying a theme, seeking questions, using mathematics as a tool for problem-solving according to the children's own wishes, to integrate their own thinking so well that the mathematical experiences become ways of conceiving and analyzing a problem." She went on: "In mathematics, I think we have not always shown children the relation of the field to the real world. Mathematics is based on observation of the real world. It is not just symbol manipulation."

As we were talking, two fourth grade boys ran into the room and got some work sheets out of a drawer. They seemed to know what to do and they went to work eagerly. This was free time for them. They were on their own in mathematics work from here on until their graduation from sixth grade. The teacher and I continued our conversation. A few minutes later, two little girls came in asking for "a new book." Apparently this request meant some new work sheets—problems, brain-teasers, games set up by the teacher, which students could take home for the weekend. It was quite evident that the enthusiasm for mathematics at this school was genuine and productive in the students I was seeing.

Mathematics appears to be woven into the whole experience of the school. I suspect a visitor could come with a special eye for art or music or reading and find corresponding delight and excitement. It is true that the experiment and discovery in this mathematics program have been surprising and exciting to this particular community and well beyond it. We believe that these efforts have something to say to people interested in making education for elementary school students challenging and enriching. This program aims to challenge *all* students and offers striking evidence in the performance of very gifted children.

Interestingly enough, it began as a remedial program. One of the teachers and the head of the school organized a special remedial group of very young children to see how far they might progress when given a chance to work with mathematics without conventional time and classroom pressures. The group and the teacher were to be free to work on problems and approaches of their own choosing. There was no scheme in direction, time, or material laid down in advance. The group soon came upon problems for which they found their arithmetical learning had not prepared them. It was not long before they were seeking solutions in logic, solid geometry, algebra, graphing, and set theory. The

excitement of the teacher and the students was contagious in the school. Parents and friends of the students began joining in the making and solving of mathematical puzzles and games and in discovering order and design through mathematics. Other students clamored to get into the adventure. There was soon no longer any question of the stigma of "going for remedial work." Actually, these supposedly remedial students ended up with a special prestige for having been in on this expanding venture from the start.

A School Looks at its Own Findings

The teacher and the head of the school wrote perceptively about their discovery at the end of two years of this experiment:

> ". . . We knew that somehow we had unleashed a power in these children. They were excited about their discovery and we could not deny them the opportunity to go on. We began to probe the depth of our own discovery: How do children put order in their universe? What would they do without the imposition of definitions, notations, corrections, and adult interference? . . ."

It was clear, even at that stage of the experiment, that the standard kinds of tests in mathematical achievement actually measured how good a child was in arithmetic computation. Skill in this involved some knowledge of notation, but where was the mysterious and exciting reality of "quantitative intuition"? How could one develop and encourage the imagination and delight which seemed to be abounding in these children's approaches to solving mathematical problems? "We were unsure after our first year who *was* a mathematically gifted child," the school's report states, "but we did know that he was not necessarily a computer."

The beginning was four years ago. The project now involves the entire school and has reached into other schools' and universities' exploration of the teaching of mathematics. The school has thousands of pages of notes describing in diary form actual class experiences, the course of certain experiments, individual students' work, brain teasers, puzzles, games, spontaneous and elaborately designed lessons. These include activities created *for* the children and often *by* the children. The teacher has called these materials "documents of discovery which give eloquent testimony to the power of innate curiosity when it is allowed to have its way."

The mathematics room that I visited was piled to the ceiling with reports, work sheets, and a tremendous variety of materials for the students to handle: Cuisenaire rods, Stern blocks, Dienes multi-base blocks, Lowenfeld geometric blocks, geo boards, all kinds of measuring devices

such as meter sticks, yard sticks, centigrade and fahrenheit thermometers, balances and scales. There were also number lines and number plane arrays, geometric and drafting tools, various kinds of graph paper, and collections of puzzles, work sheets, and mathematics books, along with the mimeographed work sheets, puzzles, brain teasers, etc. All this is handily available to the students. They have free access to all of these materials for play, for experiment, for demonstration to themselves of how something works, or for checking whether they are right about an imaginative guess.

"All these materials are far from being considered crutches to learning," the head of the school stressed. "They really constitute the child's version of the laboratory of the adult researcher. The man in the laboratory is making his direct observation, setting up experiments, collecting his data, and making generalizations, before he is willing to accept ideas as facts. This is just what these students are doing with these materials."

From what I saw, there was a great variety in the way these classes were conducted. Some were informal play sessions, quite undirected, with the children feeling the blocks or the Cuisenaire rods, building designs of their own out of them, making experiments of their own or playing with games and puzzles. The teacher puts great stress on the importance for the teacher of a good deal of this free activity for the children: "It gives the teacher a wonderful chance to collect the ideas, topics and problems that the children are interested in and are working on."

I saw other classes which were high powered question-and-answer sessions, the teacher at the center, with intense focus from each child on her challenges and her questions about student conjectures. But in these sessions the models, blocks, materials were still very much in evidence, actually in the students' hands in many cases. Central to the whole adventure is the fact that the school has thrown away the idea of ceilings of grade level achievements from the kindergarten on up. The head of the school spoke out emphatically on this: "The old math was geared to the curriculum idea of Hold the Children Back. Sometimes it was just an instrument to hide the ignorance of teachers. We are trying to break up any idea of stratifying very bright and very slow kids before it starts — fashionable though that idea may be in some places. Mathematics becomes an individual adventure as well as a group one, for *each* child."

A Visit to a Second Grade Math Session

The eight second-graders who had just come running into the room

were nearly all very good readers. The teacher had asked for them for two weeks of intensive work, with the idea of putting them pretty much on their own in mathematics for the next six weeks. They divided themselves into two groups, each at a table, and each table having its four containers of specially designed little blocks. Those children arriving first began to handle the blocks eagerly and with evident familiarity. Once the class was settled, the teacher called attention to the board, saying, "Here are some statements with holes in them. Let's make them true." The first statement on the board was this:

$$\frac{1}{2} > \square$$

The middle symbol apparently already stood for "greater than" in the minds of the children. The second statement was this one:

$$\frac{2}{3} < \square < 1$$

There seemed no question about the signs' meaning "less than" and, I gathered, the empty box always stood for an unknown number, "the place to put a number which makes the statement true."
Then the teacher added this one:

$$0 > \square > \square$$

These were apparently just a warm-up exercise to the work and play with the special blocks, the main activity of the day. I was curious to see what these seven-year-olds would do. For the first statement,

$$\frac{1}{2} > \square$$

one boy said, "Put 1/4 in the box." The teacher did. Another offered 1/16, another 1/12. One little girl took a deep breath and offered 1/1000. The teacher wrote all these down to the right of the box, putting a parenthesis mark to the left of the first one. A boy topped the girl by offering 1/1,000,000,000 followed by another little girl's 1/8 and still another's 1/–2. At this point, the teacher asked, "Do we have them all—all the numbers that will make this statement true?" The children called out "No!" in great enthusiasm and poured out more numbers, among them –1/3 and 1/39. After a little longer, the teacher asked, "Do we have them all yet?" Then she called on one little boy, who said emphatically, "You could fill that whole board up and still you wouldn't have them all!" The teacher asked the class, "Is that true?" The children looked thoughtfully at the board, and then, almost one by one, began arriving at "Yes!" The teacher then pointed to the 1/4 in the box, and said, "Yet this 1/4 does make the statement true, doesn't it?" "Yes!" several children called out. "But any of those others would make it true too!" volunteered one of the girls.

The teacher pointed to the second statement:

$$\frac{2}{3} < \square \quad < 1$$

The first suggestion came from an active little boy who fairly flew to the board to write 9/10 in the box. The class accepted this as "true". The teacher pointed to the next statement:

$$0 > \square > \square$$

A little girl asked the teacher to write –100 in the first box, and –2000 in the second box. The teacher asked another girl to "read the statement out loud." The girl read, "Zero is greater than minus one hundred which is greater than minus two thousand."

"Now," said the teacher, picking up a piece of chalk, "try this one and see if you can put something tricky in the box — but something that is true!" She wrote:

$$3 \times 3 \times 3 < \square$$

A boy offered 20¼. The teacher wrote it in the box, then asked the class rather casually, "Do you agree?" Two or three said "No!" right away, and others joined them. The teacher then said, "Well, we won't erase this — just add something that will make the statement true." A boy's hand shot up and he called out, "Put 8 in there." It read,

$$3 \times 3 \times 3 < 20¼ + 8$$

The teacher tried another, writing on the board $2 \times 2 \times 2$. She asked, "What is the simplest name for what this is?" Children offered 6, 8, 9, then more and more settled on 8. "How do you get eight?" the teacher asked one boy. He answered, "Two twos is four and four twos are eight."

"Here's one last one," the teacher said, as she wrote

$$3 \times (2 + 4) = (3 \times \square) + (3 \times \square)$$

"What shall we put in the boxes to make the whole thing true?" A boy suggested 6. The others looked at this as the teacher wrote the 6 in the boxes, and they didn't like it. They quickly agreed on 3, and the teacher now shifted back to the blocks. This whole little enterprise had taken about four minutes.

The work with some of the Dienes multi-based blocks involved each student in his own experiments, actually handling pieces of wood cut and arranged as single units, as "longs" of five units stuck together, as "flats" of five "longs" stuck together (making 25 units), or as cubes (they called them "blocks") made of five "flats" stuck together (making 125 units). I noticed later that the second table's materials were constructed on a base of four: units, "longs" made up of four units stuck together, "flats" made up of four "longs" stuck together, and "blocks" made up of four "flats" stuck together. Still later I saw a set of these made up on a base of three.

I watched the students arrange their pieces of wood in various

combinations, working under different sets of "rules of the game" given by the teacher. They maneuvered, added, took away, actually felt with their own fingers equalities and inequalities, fractions and wholes. I asked the teacher about this work after the last child had reluctantly and belatedly left the room for the play period. (I noticed too at that moment that each child but one had as a matter of course carefully cleaned up and put away his materials before leaving, and the one was called back to take care of his blocks.)

"What these children were doing today," she said to me, "was physical grouping of blocks—a reorganization of the blocks according to a place value system. The children also get a built-in feeling for fractions with these materials. No one could ever think of 1/36 as being bigger than 1/6 when he has actually handled those quantities in this way. A question like, "Which is larger, 6/10 or 1/2 would also be a silly question to these seven-year-olds. They would think it was just a matter of common sense."

I asked about the board work, and the particular item in which the boy had offered 20¼ to fill the empty box in this statement:

$$3 \times 3 \times 3 < \square$$

"He merely misread it on his first try, if he could instantly think that 20¼ would make the statement true," she said. "When this happens, I say, 'You can correct this without an eraser. How would you do it?' This gives the children some scope for their own inventiveness. That little boy today fixed his own statement by adding 8, so that the statement read

$$3 \times 3 \times 3 < 20\frac{1}{4} + 8$$

That was now true—27 is smaller than 28¼. Sometimes a child will change

$$3 \times 3 \times 3 < 20\frac{1}{4}$$

which is not a true statement, to

$$3 \times 3 \times 3 \not< 20\frac{1}{4}$$

— that is, he will make the 'smaller than' sign mean '*not* smaller than.' That way he has found his own way to make the statement true, and there are of course all sorts of other ways a child could do it and still make it true."

I asked why it was not just a question of the child's having made an error and then correcting it. She explained, "I think that a wrong answer is a challenge to 'make it right' by a new step. Actually all of life is a question of *using* whatever mistakes we make to move ahead to something 'more true.' This work today was *on technique of making something true,* not on being right or wrong."

It was time for the next class in another building, and I whipped along after the teacher to a fourth grade class for which I had no preparation at all, but which proved to be as hilarious as it was mathematically challenging.

"I Know Somebody Who Is Very, Very Eccentric!"

The fourth graders started in by volunteering adjectives as the teacher wrote them down on the board. She started before some of the other students and I had gotten settled, and she was saying to the children as I came in, "The late-comers will just have to catch on to this game." On the board were written these numerals and adjectives:

2 — eccentric
3 — hairy
5 — cute
7 — vicious
11 — obedient
13 — dirty
17 — well liked
19 — nice
23 — bold
29 — angry
31 — heroic
37 — bright
41 — silly

"You'll need a piece of scrap paper," the teacher said. She then assigned a code number to each student and explained, "Now, if 348 is the answer to a problem, how do you know it is about you?"

A lively little girl, who had played the game before, explained, "You add up the digits, and if it adds up to your number, then that's you! In 348, three plus four plus eight equals 15."

TEACHER: "Who has 15?" A little boy raised his hand eagerly.

TEACHER: "All right, Scotty, then that is about you. It's *you* when the sum of the digits is 15." She went on, "Let's say someone is cute and dirty — who is it?" (On the board, "cute's" code was 5, "dirty's" was 13.) "To find out whom we are talking about, we must multiply 5×13 and get 65. Since the sum of the digits is $6 + 5$ or 11, we know that the statement refers to child #11." A little girl leaped to her feet. "Sarah!" the teacher exclaimed delightedly, "Sarah is cute and dirty!" The room rocked with hilarity.

TEACHER: "I know somebody who is very, very eccentric." A little boy leaps to his feet. His code number was eight. "Very, very eccentric" was code for $2 \times 2 \times 2$.

TEACHER: "Someone in this room is nice and obedient." The children quickly looked at the board and Sarah leaped to her feet again. She had in a flash multiplied 19×11, then had added the digits of her

answer, 2 plus zero plus 9, and had gotten 11, which was her code number. A litle boy called out in delight, "Now Sarah is nice and obedient and dirty and cute!"

A girl set up the next one: "I know someone who is vicious and obedient." The biggest boy in the room jumped up. He had multiplied seven times eleven and gotten 77, added the two digits and come out with his own code number. The game continued with more wildness, more lightning calculation, more flashing words, more controlled, eager excitement. There were no pencils or scratch pads now—it was all going on in the children's heads.

Suddenly the teacher extended the game: "Give me a number the sum of whose digits is 13." Voices called out: 76, 94, 85, 139, 157, 2227. The teacher stopped the mounting figures: "That's getting a little large. Let's keep it in the one hundred league." The last boy settled for 184 instead of 2227. The teacher wrote the figures down, then turned to the class: "Now, keep track of what you're finding out about Roy." (She pointed to a little boy on the front row.) "76 equals two times _____?" Several students called in 38. "Is 38 prime?" the teacher asked. A quick response came from all around the class: "No, it can be divided." The teacher shifted back to the board and wrote: "2 × _____ equals 38," and added, "So the prime factors of 76 are 2 × 2 × 19."

"So Roy is very, very, very nice!" one boy announced quickly. Others around him disagreed vigorously. "The correct statement," one solemn little girl explained, "is 'very eccentric and nice.' " ("Eccentric" was #2 on the code list.)

The teacher moved in quickly with the next number: 94. "What is one of its prime factors?" One little girl called out 2. The teacher wrote "2 × _____ is 94." The class quickly filled the blank with 47.

TEACHER: "Is 47 prime?" The class said yes.

TEACHER: "Oh-oh, we have no code number for 47. This doesn't give us any news on Roy. Let's try 85. Is there a prime factor here? What is 85 divisible by?" The class offered 5. The teacher wrote 5 × _____ = 85. The class filled in 17 instantly. "So 85 equals 5 × 17."

Roy stood up as tall as he could and announced, "I am cute and well-liked!"

TEACHER: "Let's try it with 184. What are some factors of 184?" (2 × 92.) "Break it up some more." (2 × 2 × 46.) "Some more?" (2 × 2 × 2 × 23.) "Roy is: very, very eccentric and bald!" Wild hilarity greeted this. "Now, how can we make this whole thing into a sentence about Roy?" On the board was now written this:

$$76 = 2 \times 2 \times 19$$
$$94 = 2 \times 47$$
$$85 = 5 \times 17$$
$$184 = 2 \times 2 \times 2 \times 23$$

TEACHER: "Now, Roy is 2 to the 6th power, times 5, which is the next prime number, times 17 which is the next, times 19, times 23, times 47. Now what are you, Roy?"

Roy looked seriously at the board and reported, "I am very, very, very, very, very, eccentric, cute, well liked, nice, bald, and 47!" Another explosion of delight.

TEACHER: "This really doesn't equal Roy. It equals something else. Two to the 6th power, times 5, times 17, times 19, times 23, times 47 equals what? Let's make it an equation." She selected five students to go to the back of the room and multiply this out. She evidently chose the five who she felt could do it most readily. The rest came forward and gathered around her. She had a new factoring game for those remaining.

The second game seemed to me harder than the first, and the speed and accuracy — and delight — of the students even more impressive. Yet the five best "sustained computers" were in the back of the room. As the class time ended, the five came forward with their answer. The teacher told them, "Fine, now between periods, go into the office and check your answer there on the computer."

A Child's "Style"

"There are some ages when you can spot certain patterns of response," the teacher was explaining to me, after one of the classes. "Take humor, for example. There are certain things seven-year-olds think are funny that eleven-year-olds wouldn't. But in matters of *individual style*—let's call it that—there are patterns of thinking and responding which a two-year-old may show which will be basic to his approach to things when he is five or eight or eleven—perhaps always." This idea of a child's *style* in thinking seemed to me close to the heart of the challenge of educating the individual, and the complexity, even the mystery of the *style* of a gifted child's mental processes certainly pertained to the concern of this study. I asked for some examples of a child's style, as she was using the word. Here are some revealing fragments from this teacher's and the school head's comments in explaining to me what they meant by a child's individual *style*:

"Joe is a brilliant five-year-old with a rather sophisticated style.

He has such easy mastery of relationships that he can play variations on them. He taught himself to read at two. I remember once on the playground when he was three he got very frustrated in trying to communicate with his teacher. He got very mad when the teacher couldn't understand his pronunciation of 'shovel'. He finally cried out, 'Give me the s-h-o-v-e-l!' He seemed to absorb everything on his own. In class, Joe interprets every stimulus that the class gets and then those that *he* gets. The other children think he's right with them, but he's really doing far more. Among the five year olds, he sits and does his own experimenting and arrives at his own conclusions—and in ways quite different from the others." The teacher filled in this example: all of the children had a big page with a large "equal" mark in the middle. They were asked to use the Cuisenaire rods and "make a true statement." For example, a child could put a ten unit rod, a four unit rod, and a one unit rod on one side, making a total of 15 units, and on the other he could place 15 one-unit rods. The teacher told the group, "When you have made a true statement, mix up your rods and see if you can fool me." Most of the children measured out the units they actually had on each side of the equal mark, and then mixed up the two groups of rods in two piles so that the teacher would have a hard time counting the units in each pile without touching the rods.

The next request came after the teacher had issued a large piece of paper with nothing but a large "less than" symbol ($<$) on it. She asked the students to use the rods and "make a statement that would be true." The children did this, measuring out with their rods so that the collection of assorted rods on the *left* side would total a smaller number of units than the collection on the *right* side. Children would measure the amount and then scramble the rods for the teacher to guess whether they had "made a true statement" or not. Not so Joe. Joe simply put a large pile of rods of various lengths on one side and a pile on the other and left them as piles. He never separated or sorted the rods in either pile. The teacher took a look at his two piles and said, "My guess is that what you have there is not true."

Joe answered instantly, "Yes, it's false by one!"

The teacher quickly counted up the rods on each side and found out that Joe was right. In this case, the other students had measured carefully, then rearranged the rods and counted, and then scrambled them to "fool" the teacher. Joe just made a pile of rods on each side, took a look at it, and knew exactly what was there. He saw he had "made the statement false" by one unit. "Yet," the teacher emphasized, "from the point of view of the other children, Joe was doing the same thing or even less 'work' than they were. The whole thing was organ-

ized rather casually, a voluntary activity with most of the children participating."

Another example of Joe's approach occurred in play period. He was sitting at a table in the kindergarten room and the head of the school came in and noticed some little blocks with numerals or plus or minus or equal signs on them. These blocks are used for very little children simply as a substitute for writing. (They are *not* part of the structural program to which the Cuisenaire rods, for example, contribute so much.) Without a word, the school head casually pushed together on the table this "statement" in marked blocks: 2 + 3 = 5. Joe took an interest, came and moved a few other blocks in underneath and spelled out: 4 + 3 = 7. The school head substituted a minus for the plus. Joe took a look at 4 — 3, then took away the 7 and substituted the 1 block. For about ten minutes, without exchanging a single word, the school head and Joe took turns maneuvering these blocks in this way, providing the answer or changing one or the other side of the equation and still arriving at a true statement. The last one they had on the table was this:

$$86 - 9 + 5 - 2 =$$

The two players in this silent game had taken turns pushing these numbered blocks into place. Joe looked at this combination and then quietly pushed some numbered blocks into place on the right side of the "equal" mark, making clear he wished to do the finishing himself. He didn't just add up the answer. He "wrote" = 74 + 5 — 8 + 9 to match 86 — 9 + 5 — 2 =. The two players, still happily silent, decided the game had gone on long enough and each went his way.

Harry — Another Style

"Some very gifted children seem to go all directions at once. Their parents, and sometimes their teachers, worry that the kids 'aren't *producing* anything' — 'nothing gets finished!' " The teacher started to tell me about Harry.

He is seven, in first grade. "He starts a problem, then doesn't finish it. This seems to be a pattern. My question is: how far is he really *going* intellectually? Can we find out if he is taking the problem as far as he needs to take it in order to *envision* the end? If this is happening, then he doesn't need to go on to the end *physically,* to complete the drawing or the computation or the writing."

Apparently *completing* the writing out of the problem or diagram would be busy-work for him. Is there any way for his teacher to test him to see if he has understood without finishing? This teacher suggested

asking him some questions which depended on an understanding of the finished process. "We found again and again that he had gotten to the conclusion in his mind, but not on his paper. Completion is not necessarily a physical product everyone can exhibit and value. Intellectually, Harry again and again completes the job. We need to find a way of testing to see if this is happening in certain gifted children. If it is, then let's not train into them the meticulousness of a slower, more plodding mind. Creative scientists complain that we take able, leaping scientific minds and dull them into technician-minds!"

Harry's pattern shows in other areas too. He writes three spelling words in the exercise, then says, "I'm through!" after surveying the other words. It is the same with a map exercise. "He has surveyed all that is on the page and has arrived at all the answers to what has been asked, plus the answers to some more subtle questions which are related but which have *not* been asked. He is already on to a different investigation. He's not restless and inattentive—he's honest! He is saying, 'This filling-in process isn't useful to me any more.' "

Harry is almost possessed by love of music. His teacher thought it a good idea to give him a biography of Bach, one which included some discussion of Bach's works. Harry was thrilled. He kept reading bits, then would run to the piano with "I played that one last year!" or "Let's try this one!" or "Where can I find the whole music for this one?" The book kept triggering his mind off into the actual music. His teacher commented, "It must be quite a book that would do that! And quite a boy who reads that empathetically, who keeps leaping from the words to the actual stuff the words are dealing with. But he hasn't finished the book!"

His teacher made this point: "Harry can learn the steps of orderly communication later. For him it will be a matter of filling in the gaps of what he has written or said. Right now we think the important thing is *his process of discovery*. It needs to take priority over *processes of describing to others what steps lead to the discovery* and *what the discovery means.*"

Other teachers filled in other evidences of Harry's "style" and what the school was trying to do to help him use it, to develop within it. Harry, it appears, is also an expert on paleontology and anatomy. The first day he was in school happened to be Hallowe'en. He had no costume and the school didn't use any bought costumes, encouraging instead the making of home-talent costumes. One of the teachers offered Harry a sheet and said, "You can come as a ghost, Harry."

"No," said seven-year-old Harry. "I think I'd rather go as the circulatory system." With no diagram or help of any kind, he drew

a picture of the circulatory system on the sheet and then put on his costume.

One day he came into the school library and asked for a book on embryology. The librarian said she had a book on development of eggs in chickens. "No, I mean embryos in humans," said Harry. Then he got more specific with the librarian about the study of the kidney and its embryonic development. The librarian's husband was a urologist and she had some idea of what Harry was talking about, but she had to tell him she didn't have a book on that. Later a teacher overheard Harry saying with a little concern to another student, "The librarian really doesn't know much about medicine, does she?"

Harry has made some extraordinary experiments with some colored sticks with flexible joints that are in the mathematics room. He has found with these sticks and joints the five platonic solids, the five polyhedrons. He loved the names of each, incidentally, when he was told them, and he wrote a teacher in an earlier school that he had been learning about polyhedrons. (The five figures are those which can be made out of equal regular polygons.)

At one point, Harry asked for a work book on solid geometry. The teacher said, "Would this one on plane geometry be all right?" The boy said it would, and took it away. He did a good deal of work in a new book on geometry for the primary grades. He developed a number of proofs in a rather round-about but impressive way, simply for himself. He never volunteered to show them to the teacher although she saw his work when he was doing it.

He came into the first grade although he was the right age for second grade. The second grade was full but there was a place in the first. A teacher reported, "He has been very happy in the first grade and it has worked out quite well. Some parents would have wanted as bright a child as Harry to go right into a grade above. The school feels this would have been a disaster. He would have been lost among the older ones, even in matters of putting on shoes and buttoning things and other kinds of physical coordination. He is at home socially with the first grade and is exploring and using his own phenomenal resources in ways which stimulate him and please him."

Another teacher noted that Harry's best friend is the youngest girl in the six-year-old group. Interestingly enough, Harry finds her creativity and block building delightful and finds her company easy and yet lively. The mathematics teacher made this special point: "Harry is not featured a lot around here. Actually, he accompanied some of the Christmas Carol singing on the piano, but most people thought it was the music teacher playing because Harry is so little they couldn't see him

back there on the piano bench. That little concert he gave today in assembly was his first chance to perform for the whole school. We're not pushing him. Of course, when he sees a piano he has to sit down and play on it, but this is casual and accepted as a special interest and talent of one of the students."

My own last picture of Harry was that of a very small boy with feet kicking against the piano stool as he privately, raptly played a sprightly dance by Mozart.

Jeff's Style

Jeff is a seven-year-old boy of terrific humor and playfulness as well as astonishing ability and imagination. He is the kind of boy that might drive some teachers crazy, particularly if he developed in a negative way some of his own talents and approaches. He used to bring a little, inch-high teddy bear to class, and sometimes a pocket full of tiny treasures. One day he sat the teddy bear beside him as he was doing the mathematics work and the teacher began to use the little teddy in the discussions: "Now let's see what Joey (referring to the teddy bear) is doing today. Is he a little stupid today?"

Jeff immediately fell right in with this and the class began to find Joey's mistakes on the board while the teacher held him up to look at the writing on the board. On other days Joey would be very bright and make great leaps of mind, much to Jeff's delight. Jeff was never disturbing or distracting.

The teacher explained, "I think it's reasonable that seven-year-olds be allowed to bring all of themselves to class. I know a school where the first grade home room teacher took it so hard that children had these odds and ends of treasure in their pockets that she made a rule that children couldn't bring them to class. It seems too bad to make an issue of this kind. It's so easy for a teacher to adjust to this sort of thing if it seems to matter at all to the students. This boy's little Joey never got in anybody's way and actually turned out to be something of a help. Jeff knew I would play his games. For example, he got involved in working with a number of secret codes. I made up some and explained them to him, then he made up some of his own, including original numeral codes. In a lot of the exercises he would switch the relationships around. He would make 'equal' into 'not equal' or he would make 'greater than' into 'smaller than'. He'd also work out his answer in these elaborate secret codes and leave some of the problems untouched for me to work out in the same way. Those he did were always done

correctly, given all these changes and the secret code work. Potentially Jeff would be a disturber if he was forced into some kind of pattern of problem solving which didn't give opportunity for this extraordinary playfulness and his extraordinary powers of invention. These qualities are *so* easily channelized into a child's work!"

Jeff has remarkable mechanical ability in model-making and in three-dimensional space creativity in building and construction and in his experiments in solid geometry. His fine small muscles give him hand coordination which is the exasperation of his very brilliant little friends who can understand Jeff's ideas and have exciting ideas of their own but who can't make equally good models of these ideas. A little boy who usually sits with him, Louie, rejects this visualization of Jeff's ideas and has to translate all his own ideas into words. Louie is certainly "gifted" but his style is quite different from Jeff's.

Eleven Direct Challenges From A Crack Teacher

The Miquon teacher of mathematics has drafted these statements of position for a group of Philadelphia teachers she is working with in a weekly seminar all this year. They seem to us well worth including here:

1. *Praise and Reprimand*:

> "Don't get in the habit of praising the best producers. Children do not need teacher support. If the tasks they are engaged in are satisfying and demand their concentrated attention, the reward is in the thinking. Neither do they need reprimand. In the developmental group, all children seemed to want to learn whether their rate was spectacular or seemingly slow. Most of the time they all seemed to feel that they had a good and successful workout."

2. *Response to a Child's Own Discoveries*:

> "There is no time schedule by which children are ready to move to a new concept. Individual children in a laboratory environment push on at various times — often quite unexpectedly — to new thinking. They develop temporary 'passions' — (measurement for one, inequalities for another, etc.). The work sheets are so grouped that they should allow the teacher and the child to indulge a special fancy."

3. *Attitude Toward Grades*:

> "Children's work cannot be graded without introducing harmful extrinsic judgment. Instead, a careful cumulative and

dated record should be kept on each child's work. This will allow a long range perspective on a child's progress. Example: Johnny's work followed by name, date, number of problems solved correctly, and number of problems attempted."

4. *Children's Mistakes*:

"Don't force your concept of time on young children. A mistake made a few minutes ago occurred a long time ago — yesterday is ages ago. Since we do not want a psychology of defeat to develop, let's look ahead, not backwards. If you observe children making mistakes, guide them, through questions or suggestions for proving an answer, to find their errors."

5. *Attitude Toward Errors*:

"Children's mistakes should be noted by the teacher but not brought to the attention of very young children for *correction*. Emphasis on errors slows the child down and inhibits his self confidence. Errors are the teacher's problem. When too many occur, the child is obviously working on materials beyond his present comprehension or is merely misreading problems. The teacher must find out the cause. Most children are self corrective. It is wise to let a time lapse occur and then present the child with the same or similar problems. In the developmental group most errors corrected themselves without reteaching."

6. *Attitude Toward* 100% *Correct*:

Don't make your goal to get 'perfect' responses. If you do, the children are not being given problems that engage their best thinking. Learning should include some struggle. Even the best learner should meet often the experience of having to stretch himself beyond his capacity. To meet only situations that one can solve easily does not prepare for a realistic coping with scientific problems."

7. *Attitude Toward Grouping*:

"Don't fall into the trap of grouping young children permanently according to ability. Their rhythms of work and growth are too difficult for us to assess accurately, and we are too insensitive to recognize ability very early. Group children according to short range plans, interest groups, construction or writing groups, those who can read instructions versus those who cannot. Change groups constantly. With the materials included in this program, the developmental group *did not need to be divided.* Every child worked independently but often spontaneous groupings occurred when the children or the teacher felt the need for them."

8. *Attitude Toward Finishing Work*:

"Don't compel children to finish every time from top to bottom the list of problems they happen to find on a page or on a series of pages. This encourages work without judgment and waste of time. A lot of children leave uncompleted what they find too difficult or too easy. Let them browse and skip. The children in the experimental group did this with maturity. They could communicate to their teacher difficulty or boredom and were not forced to guess. There are exceptions when it is important to do a sequence in the order stated."

9. *Attitude Toward Amount of Work*:

"Only the children can judge the *quantity of work* they can do. The teacher will either over-estimate or under-estimate what a child's pace is. Six-year-olds can assume this responsibility. Under conditions of self-pacing they work at a higher level of accomplishment than when the teacher dictates the standard. In the developmental group all children worked hard and carefully most of the time and did not develop a sense of pressure, failure or guilt."

10. *Attitude Toward Repetition*:

"Do not prevent a child from repeatedly choosing the same work sheets. He might not remember having done them before because he only saw the details on the page or he enjoyed doing them so much that he is looking for the same pleasure again. It could also be that now he sees the task as a part of an orderly sequence which he wants to watch develop."

11. *Follow-up on Independent Work*:

"Our observations of the developmental group lead us to believe that there must be a time lapse between *exposure* to an idea and *independent use* of an idea. Children need time for digestion and clarification. Short — five minute — presentations through games, experiments, blackboard work, occasionally over a period of weeks, are required for most children before they are comfortable enough with the process to choose working with it on their own. Do not, therefore, prescribe direct follow-up work sheets for all children. Some will choose them when they are made available. Others who are not ready will not. However, these others are becoming ready in their own way."

A New Concept

These evidences of a school's philosophy in action in mathematics point to exciting possibilities and unsettling questions about who is

"gifted" and about what kind of flexibility, imagination and perception schools need to bring to all their teaching. A useful push into a new look at the whole question of giftedness comes from the head of this school in this statement of his school's position:

> "We need a search for giftedness much more than any attempt to find 'the gifted child!' Different environments produce different forms of giftedness, not only by the direct stimulation of a talent but also by what will be tolerated of an individual's innovations and creativity. The typical school environment is unfortunately so rigid and prescribed that the only giftedness that has a chance to flourish is productiveness of a certain kind. We hope in our school to challenge the whole concept of *what giftedness is* and *who is gifted* by giving more opportunity for thinking and then accepting the results, whether or not this produces tangible results in terms of common standards of achievement."

PART III

"TO FIND OUT WHAT YOU CAN DO AND THEN DO IT"

"You can really get an education around here. I mean each of us gets to set some goals and think about them—and I don't mean just girls." The boy speaking got a laugh on this one, yet the other boys around the library table were quick to agree with the idea about education and their own goals in education. I was meeting with about 18 eighth and ninth graders at the Eaglebrook School.[1] I had asked to meet a group of students who had been in several top sections in the various subjects. The school's schedule is arranged so that a boy can be in the most advanced of five eighth grade English sections, in the least advanced of five mathematics sections, in a "middle" foreign language section, and in a science and social studies section with no special separations based on student ability and achievement. Since I was looking at the experience of particularly gifted students for this report, I thought a special meeting with some of the most high-powered students would be revealing, along with the class visits and conversations with students, teachers and administrators planned for my visit to the school.

These boys spoke without any sheepishness about "getting an education" and it was refreshing not to have the emphasis entirely on education to "get you into a good college" or graduate school or job or, for these boys, "to get you into a good prep school." There was some talk of this, but the main focus seemed to be on having school be interesting and challenging, in an out of the classroom, and on appreciation for opportunities to "find out what you can do and really do it," as one boy said. Faces and voices from around this discussion table kept reappearing in my memory at virtually every encounter I had with many parts of this school's life. The boys had plenty to say about choosing courses, about "being with the brightest when you can keep up, and not having to struggle with the brightest in subjects where you can't," about committee work that is "real—not manufac-

[1]Eaglebrook School, Mountain Road, Deerfield, Mass., C. Thurston Chase, Headmaster. A boys' boarding school, grades 4-9. 159 boys. Faculty: full-time 29, part-time 7.

tured," about the school's marking and rating systems, about morale in sports, about just what "the teacher's interest in the individual" amounted to, about what ideal teaching and un-ideal teaching constituted, about what a school climate can do "to let you explore and find yourself." It was an exciting start to this visit.

A Look at the School

The Eaglebrook School has boys from nine to sixteen years old, from 25 states and 6 countries. Thus, there is a good deal of variety in the kind of experience, ability, and attitude that applicants to the school bring with them. Some have been in public schools in small towns. Others have been in plush suburban public or private schools, some have been in foreign schools with the work done in English or in the language of the country. Some come from communities where there is a genuine respect for education and a lot of interest in college, while others come from communities where anti-intellectualism is a popular entertainment or a strong conviction. In general, these students do come from families who care about quality in education and who have serious ambitions for the later secondary school and college experience. The variety in background and experience of its students has challenged the school to a good deal of experiment and exploration in the last thirty-five years in order to make, as the headmaster put it, "a learning environment that is both stimulating and flexible." Perhaps schools have always talked about Meeting Individual Needs and having students Realize Their Maximum Potential, and such aims are certainly popular today. Schools disagree on how to work for these aims, and different schools have different challenges and different possibilities as they approach the job. This school's efforts seemed to us worth a close look, even as the school, the students, and the climate for learning may be quite different from those of another school down the street or in this study.

Selection of Students

"Some of the schools our applicants are attending send us the works on ability and achievement tests—even full records on tests like those of the Educational Records Bureau. Some others give us a sketchy picture of a boy's powers and performance. We have to find out as much as we can, and find ways to do it as thoroughly as we can for each applicant." The headmaster was explaining the school's selection methods, and got into the question of standardized tests. "If what we have on an applicant is sketchy, we give some standardized test or

ask that they be given at home, so that we can get a percentile comparison with our own students and the independent school students around the country."

He stressed the wariness with which the school looked at group tests, however. He spoke of the possibilities of a student's powers being blocked by early reading troubles, poor training, or emotional problems. To sharpen the school's picture of an applicant, the admissions office normally asks an applicant to take an individually administered Wechsler Intelligence Scale for Children (W.I.S.C.) and a Gilmore Oral Reading Test or its equivalent. The school's staff will give these when possible. Sometimes they are given by a psychologist or a testing service in the applicant's home community.

The headmaster spoke of the Gilmore test as "a most revealing test if it's administered and interpreted well. It's useful in the way it describes reading skills and reading trouble, and also in what it tells about early training and early habits in learning. We think it's useful for everybody—gifted students and slow students."

He spoke of the WISC's eleven sub-tests as "the best analysis of a child's basic, actually functioning intelligence that we know." These "performance tests" also give some indication about aptitudes which are not strictly academic. The school attempts to make the best possible use of this added information in challenging an able, wide-ranging student to mature as a person.

The headmaster spoke of "competent and cautious interpretation" of these tests and of the help they give in better planning and guidance for the verbally gifted child. He added, "They are also good at helping spot the brilliant under-achiever, and they give some indications about emotional disturbance which a school needs to be aware of in thinking about the kind of person it can assimilate successfully and the kind of person it can't." The school looks for as much as it can find through correspondence on a boy's home background, attitudes, and interests, through personal interviews with both parents, and through separate interviews with the applicant.

Placement

"Once a boy is accepted in the school, we try for realistic placement, seasoned with some hope," the headmaster explained. I thought of the boy at the head of the library table who had said, "I think the sectioning here is an important thing about the school—you get with the more advanced people if you're advanced in the subject, and you don't get stuck with too advanced people if you're not interested or if you're not

that good." The planning for this sectioning is based on a boy's ability and achievement in relation to the Eaglebrook students and to the national independent school population, on a close look at Educational Records Bureau test results, on the performance on the Independent Schools Education Board examinations, and sometimes on performance on the school's own essay tests.

What Is Meant By "Flexibility" Here?

What the boys in our discussion had talked about as "elasticity in the sectioning" the teachers and administrators called "flexibility." But both groups seemed clearly to be talking about the same approach in the school. In grades four, five and six, Eaglebrook's Lower School, the students are grouped without exact definition of grade level. Thus, a boy who is theoretically a sixth grader might be studying social studies at a seventh grade level, mathematics at a low sixth grade level, and spelling on a fifth grade level. The groups are small and the teachers' efforts and expectations aim at overcoming serious handicaps by the year's end or giving opportunities for real exploration to able and adventurous minds. There may be need for less extreme variety and flexibility in the older grades than in the younger ones. "Even among the youngest boys," one teacher said, "we try hard to give opportunities for enrichment and creativity for *all* the groups and this isn't just a matter of nice non-academic busy-work. Sometimes the most gifted boy will show his powers first or best in something outside of the academic league. Sometimes a boy who looks pretty slow will show some special talent in this way, perhaps between sessions in spelling and mathematics. And sometimes some work is going on in music or art that is really fine and that serves to bring new life and force to the academic progress."

Another teacher reinforced this: "You can't just go in for 'enrichment' and 'creativity' for the bright ones and let the plodding ones plod. There can be different kinds of enrichment and different kinds of experiences in creativity, but it's up to us to figure out what kinds are appropriate *and* to let the student do some choosing and exploring himself." This comment evoked a boy's face in my mind, and his comment made in our library-table discussion: "You feel you get to do some *choosing* in this school. It makes you feel better when you choose something — an activity or a course or a topic for special study — it isn't just a matter of getting stuck with things automatically. It's more interesting for a person and it makes for a better morale in the school." The school's intention seemed to have gotten through to this eighth grader and to the boys who were agreeing with him as he spoke.

Junior High School Scheduling

There are four sections of most subjects in the seventh grade, five in the eighth grade, and four in the ninth. Students are put in sections with the idea of having groups of fairly equal ability and preparation in the subject. This kind of scheduling is done in English, mathematics and foreign languages. It is generally not done in social studies and science. *The four or five different sections of a subject meet simultaneously.* I have heard school administrators say that this is impossible to handle but apparently it *is* possible and is working here rather as a matter of course. The obvious advantage of this plan is that a boy can move from one mathematics section, say, to a higher or lower one, if this move is thought to be desirable, *and* he can do this without disrupting his whole program. The top sections in the school are generally the largest. Teachers report a morale of special incentive and competition in these, and there is emphasis on individual projects going well beyond textbook and curriculum limits.

I asked the group of boys in the library if this made a very cut-throat atmosphere in a top section in mathematics or English or French. One said, "It *is* pretty lively in there, but I wouldn't say it was cut-throat and I don't think there is a lot of big deal stuff about Aren't We Bright."

Another boy added, "It's the kind of experience—being in a top section in a subject—that knocks the chip off your shoulder in a hurry." I asked him what he meant by this. He explained, "Well, you feel it's an honor to be in the top section, but you're in there with people who really keep you on your toes. I mean, you can't get carried away with how bright you are or anything."

The sections for less able students tend to be smaller, with more stress on individual work with the poorly prepared students or students having trouble for other reasons. It is understood that a boy can be moved to a faster section if he is ready, and sometimes a student who is in over his head can be moved to a section where things are less overwhelming. The headmaster and a number of teachers emphasized the meetings of the various departments which keep teachers aware of each student's performance and which include a close look at the current sectioning at the time of the meeting. At the end of each term there is a complete review of all section placement. Occasionally a boy may change an entire course at term-end. The school also gives standardized tests in October and March, and these, as well as classroom performance, influence sectioning.

The Headmaster on Implications of This Sectioning

"Many of our ninth grade boys are hoping to get into high-powered boarding schools. This really puts considerable burden on the teachers of the slower sections, but we try to put in special-help groups in writing or in mathematical fundamentals, for example. But the students in the top sections will not have trouble with the academic requirements of the most demanding secondary schools. What they need is some extra challenge. We set up a good deal of this in music, art, crafts, school publications and a pretty vigorous student government program. Some able boys carry a fifth major subject. This way some have a chance to study two foreign languages at the same time and still keep top work going in history and science. Sometimes boys in a top section will be well into the work of the grade above, and this can mean advanced placement in the secondary school in mathematics or in a language. But I think that more important than advanced placement in the secondary school is the chance for these top students to do real exploring in the subject—reading, research, papers, reports, all demanding scope and maturity and real commitment."

I asked the standard question about the able student needing to know and sympathize with the problems of the slower student and the one about the stimulus that presumably the very bright student can bring to the not so bright one who sits in class with him in an "ungrouped" section. The headmaster answered, "I don't think any of our classes are so homogeneous that the challenge is lacking, and I think that the contrasts between the work of the various sections are not so obvious to the students as they are to the teachers. I don't think they lead to discouragement on the part of the students. Most important, no matter how carefully we work to place students in this or that section, the test is always in performance. The conscientious, hard working boy may realistically hope to get in the top section with the brightest students. The able student that just doesn't care will not be in with the brightest students even though he won't be in with the slowest. This kind of thing is possible when you have four or five sections of the same subject meeting simultaneously. I really believe, after all our experimenting with various grouping systems, that most students learn more quickly and better when they're cooperating and competing with other students who are their intellectual peers."

Reward for Effort

Teachers and students spoke of the school's policy of rating effort as well as academic achievement. The effort rating is a basis for both re-

ward and restriction. It stands by itself as an evaluation of students. This obviously could cause a good many bad feelings if it were not handled with care and skill. I was impressed that a number of the boys who raised this subject spoke of "the effort system" thoughtfully and approvingly. One said, "For one thing, it shows your parents that you're working and this keeps them happy." Another boy who was not in any of the top sections said, "A good effort rating gives you a boost when you need it and when you deserve it, even though you may not be pulling down the grades that some of the other boys are getting." Another practical fellow said, "It pays off in a lot of ways—I mean you get privileges like being allowed to study in your room."

Numerical grades for academic achievement come once a month. The effort marks come every two weeks. I was impressed too that both teachers and students, independent of each other's prompting, said that a high effort rating *did* carry status in the school. Students are involved in some self-evaluation in this matter of rating, although the teacher makes the final evaluation. One boy commented, "The status a boy has from a high effort rating may not be as good as the status the boy has who gets the top marks in his subjects, but it's still high." The fact that certain privileges are based on the effort ratings certainly helps dignify the meaning of the effort ratings. I could find no evidence of resentments about fairness in evaluation of students' effort. The headmaster put it as a matter of school philosophy: "The emphasis on the desire to learn here has become, we hope, an indication of citizenship, an important part of status and acceptance in the student body."

The effort ratings are intended to support real interest in learning and real desire to act constructively on this interest. The effort rating also aims at learning for all, and provides certain rewards and status for the students who may not be getting congratulations for continuous outstanding *achievement.*

The Challenge to Teachers

Whatever the plans for sectioning, whatever the special materials and opportunities designed for the gifted, and whatever the school's determination to do the best possible teaching of the individual, a crucial responsibility of a school is that of giving the teacher stimulation and scope to develop his own style, perception and imagination. This needs to go with the encouragement to explore the developments in his subject field and the important findings in psychology which relate to teaching. It is all too easy for a boarding school teacher to become submerged in the personalities of the third floor of the dorm, the basketball five, the

swimming team, the special-help sessions, and the endless student and faculty committees. Even without teaching a single class, he can be busy enough to be lost to many opportunities to think or grow. Add to all this a long day's classroom schedule and one can see considerable threat to a teacher's chance to develop as a teacher.

The Eaglebrook School has a ratio of one teacher to six students and the normal teaching load is three classes daily. Classes range from four to fourteen, and usually have about ten boys. This arrangement is certainly a major step in making possible the kind of teaching which challenges individuals from highly gifted to very slow. It is only one step, however. Regularly scheduled department meetings or faculty meetings to discuss individual students' progress are also important and are stressed in this school. Still another step toward better teaching of the individual is the school's policy of having a number of experienced teachers carry one class at each grade level and, when feasible, each teacher will carry one fast section, one medium section, and one slow section. This challenges teachers in the demands of more than one approach and one kind of teaching experience. However, there are often teachers who do their best work with advanced students or with slow students or with students of a certain age. The planning for teachers' class assignments takes this possibility into account as well.

These arrangements help provide a situation in which more effective teaching of the individual may flower. The school tries to see to it that something stimulating happens in this situation. For example, over the past few years, the school has called in a number of consultants to work with its faculty. The consultants are not simply one-day lecturers. They conduct a series of seminars and consultation sessions. Two noted psychologists have met with the faculty once or twice a month for two years to discuss current explorations in the psychology of teaching. Key people in psychological testing have had advisory relationships with the school. An outstanding English teacher of national reputation is working with the school's English department on a long-range experiment now involving the seventh grade English program. An outstanding secondary school history teacher has worked for two years with the history department, raising new questions and challenges and helping in an evaluation of the history program. A central person in the research on the new mathematics came to the school for a three day session, taught demonstration classes of students and worked with the faculty *and with interested people in the community.* The students, teachers and adults from the surrounding area had the advantage of this evidently most stimulating visit. The impact of the three days was still reverberating in the school when I was visiting. Weekly sessions for

mathematics teachers, running through a full term, were conducted by a professor from a nearby university, and these sessions will be resumed within a year. This kind of consultation is intended to bring teachers new ideas, new beginnings to exploration, and new insight into subject and teaching.

A special fund, the gift of a former parent and trustee, has been set up for continuing education for and stimulus to teachers. It pays for such consultants as these, may provide for National Science Foundation summer experiences for certain teachers, and for many other kinds of summer study and travel. "The hope is that these experiences will not only give all of us new ideas and methods to plow into our teaching but will give us some new bases for self criticism—for evaluation of what we're doing and what we're planning," the headmaster said to me. He added, "It isn't just a matter of having somebody come and speak and then disappear. That would probably be better than nothing. But I think the real value of this program of consultants is that these key people stay here for a few days or come for a whole year in a regularly planned program. They get to know the teachers and often the students. We have a chance to see these experts teach students or teachers, and we can question them and have some kind of professional relationship with them which is very stimulating. A school's setting on a hill with beautiful country surroundings is very nourishing for the spirit, but it can also be isolating and deceptively comfortable. We try to see that this isolation and this deceptive comfort get a pretty good shaking up, if they seem to be encroaching at all."

I asked about the board of trustees' relationship to these projects, and the headmaster explained, "On the board there is a finance committee, a development committee and an education committee. The education committee is very interested in the idea of enrichment of teachers. Its members are all for this program of consultants and have backed it all the way. The summer experiences for teachers are a crucial part of our school experience now. Last summer we sent two teachers to the Bread Loaf School of English at Middlebury, one to the Russian Institute, another to a high-powered program on the teaching of reading. We sent two art teachers for special experiences of travel and study of ceramics, and a history teacher for some study of his own. Still another man attended a workshop in programed instruction. Ten teachers, more than a third of the full-time faculty, received grants. The summer before, a large piece of the fund was given to a science teacher and his wife, herself a brilliant math teacher. They went with their children in a trailer on a special geology and conservation research project covering several thousand miles. One of the many useful results of this trip has been a tremendous boost to the science teaching here in the school."

A few minutes after this conversation about stimulating and challenging teachers, I visited a mathematics class, the top section of ninth grade mathematics. Watching the class, and, later, talking with the teacher, I felt I was seeing Exhibit A of just how all this emphasis on enriching teaching was paying off in the school. Even though the teacher was extraordinarily able anyway, surely the climate of the school and the experiences provided by the school played an important part in her effectiveness.

The class's nine boys were having an algebra session with an alert and skillful woman whom they addressed as "ma'am" without any apparent self-consciousness. What was striking to me was the way the material was approached not simply as a maneuvering of symbols or a race to answers, but as a challenge to thought. The teacher seemed never to miss a chance to ask an unexpected question. Equally important, she was quick and ready to recognize the moment when a peripheral question or a sudden leap of the mind was ready in the mind of one of the students. When she was writing on the board, she was careful to see that they understood and contributed to the processes and techniques she was using. They were doing the thinking together.

As they moved into problems which were "not included in our number possibilities," some of the students became alternately puzzled and delighted. The teacher explained, "You need to be able to see when there's no solution to a problem just as much as you need to be able to find the right solution to another problem. It's perfectly possible that an equation may be written which represents facts for which there *is* no solution." The group then worked through some problems among which there appeared several which did not have a solution. The implications of this came out in a few of the students' comments, and the teacher reinforced these by a summary comment: "It's just as important in a practical situation to be able to see that 'this problem has no solution' as it is to go after procedures and answers when they are available." There were more challenges, more surprises, no chance just to work through one similar ordeal after another.

The students leaped to problems with *two* solutions, to problems where students could think of no proof that applied. ("Is the fact that you can't think of a proof significant? And does it say that there isn't any?") There was a sudden connection with a significant moment in history and what happened afterwards: "What we've just done seemed to the Greeks to be a discovery of earth-shaking consequences. This was a new concept for them—that there must be another kind of number—

what we call an irrational number. This seemed to the Greeks too much, they kept it dark—there was no open end to their thinking about this."

The leaps of mind were sometimes made by the teacher, more often made by the students. I was sitting so that I could see faces and bodies and not just the backs of heads. People were in action in this room. The students were enlisted in a kind of serious intellectual game played with a light touch, with quick shifts, unexpected turns, deep thrusts into the nature of thought and the nature of discovery.

A Summer Encounter With The New Mathematics

A few hours later I talked with this same teacher about her summer experience in one of the National Science Foundation graduate mathematics programs which she had attended the previous summer. I was curious about the program itself, about the experience she had had, and about the impact she felt it had had on her own teaching. She spoke enthusiastically: "I think the National Science Foundation's summer course is a must for teachers who want to get involved in the new mathematics. You have to face the fact that it is rough on the teacher psychologically, but it's good in so many other ways. Especially it's good for the teacher's relationship to students when he walks into the classroom without his old text and can say honestly, 'All this is new to me too!' "

I asked what she meant by the program being "rough on teachers psychologically." "Well, you realize the work is all in graduate mathematics and it's very difficult—maybe unrealistically so. A number of teachers—mathematics majors—seemed to be getting pretty desperate as they encountered this new material so intensively—and for the first time on the graduate mathematics level. It may also be that three courses are too many. I was utterly exhausted at the end of the summer. I think it gave me a great deal. What I question is whether such intensive study of brand new material and in such quantity is realistic or actually possible even for a lot of really able and ambitious teachers."

I asked what she felt she had brought back to her teaching from the summer. "Well, for one thing, the summer program was tremendously reassuring in that you're encountering all this new material with a whole lot of teachers who, like you, have been hearing about the new mathematics and wondering about it. You have a chance to meet it with other professionals, to talk about it, question it, and explore just what it means for your own teaching. This was an exciting group venture. I think I brought back to my class more confidence in myself as I used these new approaches to mathematics—more confidence that I am

on the right ground and am not wasting time when in class we seem to be deviating from the printed material we're using. I think it's important in the classroom to have mathematics be an expanding process. I feel more confident now when I say, in effect, 'Let's free-wheel a bit!' I feel more comfortable in the classroom. I feel I'm in on the ground floor of something that's changing and I think the students like being enlisted in this new adventure too."

I asked how the students seemed to take to the new materials and approaches. "The new math seems to be something the kids take to very easily. It's much easier for them than for the teacher who has been grounded in something quite different. The kids accept it readily, while the teachers often struggle against it or have to unlearn old approaches and see the field in a whole new way."

She interrupted herself suddenly to say, "On the impact of that summer on my own teaching—another thing was that now I find the Continental Classroom on television enormously helpful. I'm able to follow it and I never miss it. This is not such a small by-product for the teachers who get this National Science Foundation summer experience. They, or at least speaking for myself, I read more now and I know what I'm reading. And I know where I want to explore. I feel more comfortable in my teaching, besides which brand new things seem to be happening in the classroom. For instance, right now I have a very able seventh grader—able linguistically, that is. He's brilliant in English, but up to now he has never passed a math course. He would always try, then get bored or discouraged. Using the new materials in the seventh grade class, I find to my amazement—and to his—that he is the first to get the answer. When David Page was visiting the school and doing some demonstration teaching of the new mathematics, this boy was thrilled. He simply 'came to'. The newness delighted him. Since then his confidence has begun to grow. It's as if he found out that this was for him—that it was *worth* exploring. There's a difference in the approach even when we use some of the old materials now. I think we're teaching algebra earlier with the idea of developing abstract concepts—not the idea of taking younger children and pushing them through the formal processes of the old kind of algebra."

A School Philosophy in Action

I talked with a number of teachers in my visit to the school and the conversation just described was in many ways representative of the enthusiasm and adventurousness which the school seems to value especially. The teacher who had been on the summer geological study with

his family described to me his seventh grade course in geography-science.[1] His comments on the drawing together of the insights of different branches of science were striking, as was his use in the program of his own special interests in biology and conservation. "It should happen in seventh grade—it should happen all along the line—that the students have some inkling of understanding of a fuller picture than most ever get in science. So often students move in and out of the little pigeon-holes of science. Even some scientists see no relationship between the sciences, and certainly educated adults often get a sense that science is a series of private and separate rooms."

I saw a top-section geography-science class in action, taught by a man who certainly seemed congenial to this philosophy. His method with the seventh graders seemed based on a series of invitations to the students to "take it from there." After the showing of a film, the teacher described an experiment that he was carrying on at his own home, and added quite casually, "If you are interested, come on over at five o'clock this afternoon and we'll start a new one." A little later, students were looking into the micro projector. "Some of you might want to come up and look." All the students came and had a look at the slides and made speculations as to what was happening. Then the teacher made a new slide and left it for viewing as he invited new speculations from the boys who were looking through the micro projector. There was eager interest and quiet, skillful questioning from the teacher, as well as some significant silences when he let the students carry the dialogue entirely. They were curious and speculative—and very much alive.

I visited the slowest ninth grade English class, taught by a teacher who also taught the brightest seventh grade group. This visit gave me a reminder, if I needed one, that a personal, individual approach to the people in a classroom was not something needed only by gifted students. The class had been studying material from Hugo's *Les Misérables*. The teacher raised some searching questions about the nature of the feelings and tensions in the two characters who were confronting each other. There was no question of Filling In the Answers. The students had read the material and knew what was happening in it. Questions on motivations, ideals, reactions to experience, probed *and related* both the literary material and local school experiences. At certain moments Jean Valjean's encounter touched closely a recent campus issue without loss of dignity to either experience. The discussion was carried on with a real effort toward precision on terms, facts and judgments. At the same time, the teacher seemed to respect and support comments coming from stu-

[1]A written description of this interesting program is available from the school.

dents as sincere and thoughtful. The teacher tailored his questions to what seemed to be "working" in the class. And he was flexible enough to encourage the students to develop and explore their own vision of what they were reading. It was a clear example of a philosophy evident in so many experiences I encountered at Eaglebrook which does *not* say "challenge and enrich the gifted—keep the average on the routine track."

PART IV

A READING PROGRAM FOR 29 SECOND GRADERS

"If she had all 150-IQ children in her second grade, it would still turn out to look like heterogeneous grouping!" The principal of the Cabot School[1] made a crucial point to me about a program of individualized reading which a second grade teacher had developed in this school. I had talked at length with the teacher and watched a good deal of the day's work in class, and I saw the principal's point as an important one for this report on teaching gifted elementary students. Here was a program which acted out a belief in individual education, with or without special grouping of bright children.

Individualized reading, as a term used to describe this program, refers to the way books and teaching are used to accompany the school's group-reading methods. In the second grade classroom, the content and difficulty of the reading the children are doing vary tremendously. "Last year," the teacher said to me, "I had twenty nine students who read something like 1500 books—pre-primers through high school books. The children have the idea of reading as something they do independently, something which has to do with their own learning, something they have responsibility for." This teacher has no time for series of "graded readers" through which, as she said, "the class advances at the pace set by the slowest child." The practice of dividing a class into reading groups and having each of these groups working on different readers seemed to this teacher little better. "You often see in classrooms a lot of time being wasted as a teacher works with one or another of the reading groups. Sometimes there is a student teacher and she and the teacher circulate around to try to keep the students focused and busy. I think what is needed is to have each child on his own, having his own 'spiral development,' you might say, in his work in reading."

It was evident that there was nothing haphazard about this program. The child has his responsibilities and the teacher is connected with each child's reading, through her own checking, through a system of

[1]The Cabot School, Newtonville, Mass., Dorothy H. Stewart, Principal. A co-educational, public day school, kindergarten through grade six. 532 students. Faculty: full-time, 17. Teacher in charge of the reading program described in this section: Miss Dorothy L. White.

recording and helping each other which the children carry out, and through the continual bringing of new books into the classroom library and the classroom life. "I think this really is the only kind of 'ungraded school' possible in a self-contained classroom," the teacher said to me, and what I saw in this classroom a few minutes later (including a look at the enormous variety of books in the hands of the children) certainly reinforced this impression.

What Kind of Books and How to Get Them?

This program is based on a continually growing collection of "trade books," as distinguished from regular textbooks. "A single story in a good-looking format seems to be far more attractive to children than a collection, and it is certainly more adapted to individual choice and individual reading ability," the teacher commented. The books read include a great range of subjects and a great variety in vocabulary, style, maturity of approach, size and amount of print on a page, amount of illustration, and number of pages. Books are brought in from public libraries, bookmobiles, homes. The school's funds are carefully used to enrich and vary the classroom collection. The teacher and her principal had a good deal to say to me about objections to the cost of such a program. The teacher explained, "This program is actually not more expensive than a standard purchase of book sets. If you get six sets of basic readers, there are nine to twelve stories in a set and each child will read, say, six. Yet with regular 'trade' books, a class can have about 70 different reading experiences *for each child* for the same amount of the school's money." The principal, who has seen the development and impact of this program over the years, arranges to steer any extra budget money to a fund for buying books for this class.

What Kind of Teaching?

"A great deal depends on the teacher's knowledge of the children in a program like this," the principal emphasized. "She has got to know a good deal about the actual reading skills of each child in the room, of course. But she also needs to know about the interests and experiences and ways of thinking and exploring that children bring to the classroom. Even beyond this, she needs to know all she can about the children's backgrounds and home experiences. She has to be willing to search out books of all kinds, to read hundreds of them and discern what kinds of books might be appropriate to certain children. This sounds like a tall order, but this teacher does this, and does it superbly."

I asked about the teacher trainees I saw in the school. "They learn

a very great deal with this teacher," the principal answered, "though some of them are rather appalled at the demands such an approach makes on the teacher. Some are challenged and delighted by it. Others find it is just too much, or they are not with us long enough to develop some confidence in their ability to try it. There is no question that it is easier just to plow through a limited set of readers with one's class. But with some organization and some perception, a teacher can do better than that." I was to see something of both organization and perception in the classroom where this project's teacher and her students were in action.

Re-Check Day

I sat in the middle of the room as the reading activities began, but no one seemed to bother about there being a visitor. The teacher was asking for a show of hands on just who had read a certain rabbit story which she held up in the air. Seven children raised their hands. She asked them to come up to her reading table and she started a little discussion with them. "What did you think of the story?" "Did you find it hard reading?" "What new words did you find?" The children seemed eager to talk. One boy rattled off eight "new words" without looking at the book or any notes. The teacher asked a new little boy, "Do you know what our three tests are?" He did, and answered with evident pleasure, "Know the words, know the story, and read smoothly!"

Around the room other children were reading quietly. There seemed to be no question of their waiting to be featured or quizzed or urged to work on their own. Now and then a child would get up and go to the classroom library to choose another book. At the table, the teacher stopped one of the children reading aloud and asked for meanings of certain words like trout, stream, lake. (One girl defined a lake as "a large-sized brook.") A girl looked at a picture of the rabbit fishing, and asked, "What is he using for bait?" A boy pointed to the carrot on the end of the fishing pole. The teacher asked, "Who can spell 'bait'?" as she held the picture up so the other six children could see it. One child tried "b-a-t-e." The teacher said, "It's the same sound as in 'tail'." The next speller came instantly through with b-a-i-t. The teacher pointed to a mountain in one of the illustrations, saying, "These are called the Alps. Do you know what country they are in?" A moment later she asked about the crocus in a picture, about its origin in a bulb, about the spelling of bulb, about when one sees the crocus around Newtonville. The children answered eagerly, evidently delighted in the book and delighted in the many ramifications of the teacher's

exploratory questioning. The kind of associations the teacher *and the children* were making seemed to enliven a review of the book and at the same time reach way beyond the book without leaving it entirely behind. The book became a starting point for some exploring about geography, about nature, about sounds and symbols.

I noticed a student teacher working with two children at the board at the other end of the room. The other children, about twenty-two of them, continued their reading or writing at their seats. The teacher said to her little group of seven, "Take a look at this lovely picture. What do you call the artist who does the pictures for a book?" One child offered "illustrator." The teacher wrote the word down in syllables on a piece of paper so the children could see it. Then she shifted back into the book, leading the children back from their explorations into the experience that had launched them: "What was this story really about?" Then, "Did the bunny really want to run away?" Then, "Would the mother let him go far?" Then, "Do you think the mother loved him?" These questions brought literal, plot-retelling answers from two of the children, rather speculative generalizations about relationships between mothers and children from several others. Each child had something to say and was encouraged and accepted for what he contributed. The teacher did not make any great fuss about supporting each comment. The procedure was quite matter-of-fact, as if it went without saying that the children would have something interesting to offer and that their exploration was worth making. She inserted her bits on spelling, pronunciation, and vocabulary at points where these were needed and appropriate. I noticed on the table a sheet with some key words from this book. The words were related in a pattern of meaning, they were not just items in a list. This list read:

1. a trout stream
2. fisherman
3. become a rock
4. on a mountain
5. high above you
6. a mountain climber
7. crocus
8. hidden garden
9. a gardener
10. join a circus
11. a flying trapeze
12. tightrope walker
13. I like just as well

I saw over one child's shoulder his reading record which he had brought with him, with the title and the date finished written after this rabbit story and a note that it had been checked. The "official checker," a student, was noted by name on the list. This particular list already had twenty-seven books on it, and one next to it had twenty-four. (My visit was early in November.)

The seven children returned to their seats, and a new group came forward to talk about an evidently much more difficult book about a magician. Each of these children had already been checked by one of the "official checkers" of this book. I had a look at the question sheet that a student checker used when working with a child who had just read this book. It had a vocabulary chart written on it, like the one just described for the rabbit story, and a list of nine questions the checker might use in discussing the book. In the midst of this group's discussion, a child came up from the back of the room offering the teacher "a new book I liked a lot." The teacher called for the attention of all the children in the room, held the book up, and mentioned that "Joe has just finished this and liked it a lot." A few minutes later, another child left a book on the teacher's desk, then returned to his seat. The teacher held the book up and spoke again to the whole class: "Here is *I Like Red* that some of you have been hearing about. If you read it, have your check with John or Emilio or Doris." A little later, a boy came up to whisper in the teacher's ear. The teacher listened, then asked the class, "Who has *I Want to Be a Pilot?*" A few children reached into their desks to look for it, and one found it and brought it forward. The teacher asked him if he wanted a new book, and he did. Without any further exchange, he went over to the library section of the room and started to look for one, and the teacher returned to working with her group on the magician story.

These interruptions could have been chaotic. Actually they did not even seem to be interruptions. They were part of the quiet, necessary business of the class and they caused no disruption. The teacher seemed able to handle the individual questions and comments, to question or report to the class, and to carry on the work with her little group all at once and with ease.

Later in the morning, the teacher called for a boy named Martin. He came up, carrying a book about the Civil War. I soon got a good look at its print and style. It seemed a reasonably lively book for a junior high school student. The teacher and Martin had a searching and lively session, talking over aspects of the story, exploring meanings of words not directly used in the book ("What do you call it when a crew seizes a ship?"), and reading aloud. Again, even as she talked

with Martin, the teacher reached out easily and quietly to take such part as was needed in the work of the class. A girl asked for the official checker of *I Want to Be a Postman,* the checker appeared, and the two children went off into a corner. Another boy came up to the teacher and whispered, "I checked Joey." The teacher nodded, made a check mark on a nearby paper, and went right on talking with Martin, who was sketching a rough map to explain to the teacher where his book's hero had sailed from. A little girl came up to tell the teacher, "I finished this one and there are seven words I don't know." The teacher spoke to a girl sitting behind her: "Mary, would you help Barbara with these seven words in her book? You've read it and I'm anxious for her to finish up so I can hear her read." I was to learn more about Barbara in a few minutes. The teacher looked back at Martin's map, soon began on some words with him. I saw him write "persuade" and, beside it, "tries to convince." She ended by asking him to write her a little six-sentence résumé "of what the story told you. Try this as an experiment—use your own words." Martin picked up his book, thanked the teacher and went back to his seat to work.

Barbara came up next, having been over her seven words with her little friend. Her seven words were ladybug, flew, away, fish, were, mine, bust. She read through her little book with the teacher, who occasionally covered one of the words with her hand and asked her to spell "were" or spell "away" or to "write it in the air." At one point, the teacher said to her, "Good, now tonight be sure to tell your mother that you learned to spell two new words today." Barbara read aloud slowly, moving her finger along under each word. Sometimes she would freeze on a certain word or a question from the teacher. The teacher would lead her from her confusion to the point where she could reason out an answer on her own. (I thought of the boy in the Miquon mathematics room and the "wrong" answer he gave which the teacher "corrected" by asking the class to "add something on this side of the equal mark which will make this statement true.") A simple example was this: the teacher asked Barbara why the red-haired girl in the story had red as a favorite color. Barbara was puzzled at this "why." Instead of pointing to the next page in the story, the teacher said, "Would it be easy to lose this girl in a crowd?" This was enough for Barbara to evoke the scene in the story and tell the teacher about why the girl appreciated the color red as much as she did.

A little later, Barbara kept seeing the word "birthday" but saying "party." The teacher said, "Show me 'party' somewhere else on that page." The girl moved her finger under each word until she came to "birthday." She stopped, thought, suddenly got the idea that the word

printed there was "birthday" even though she had been saying "party" when she saw it. Barbara was delighted. In fact each step of the teacher's conference with Barbara seemed to be a revelation to the child. The school's evidence on Barbara, the teacher told me later, told a story of confusion and anxiety that was painful to hear, and the impact of these problems on the child's school performance had been crippling. She had been totally unable to read anything two months before. Yet there was evidence too of strong intelligence, and the teacher's efforts were turned toward bringing that intelligence to free the child at least of some of her difficulties in reading. Barbara's progress in two months was evidently phenomenal. She closed her book at the end of the conference, and stood proudly while the teacher called the class's attention to the fact that Barbara was now an official checker of that book. The book was doubtless the easiest in the room, mostly pictures and about four or five words to a page. The teacher somehow "made this all right" with no sign of patronizing.

Apparently Martin and Barbara were both extremely bright. Martin had his powers in hand and was pushing far ahead. Barbara was struggling to find and use hers, amid emotional distress and initial failure. *Both* children were making progress, both were doing work *appropriate to them* in reading.

The last I saw of this group of second graders was a gather-around peering session with ten of the children trying to study the insects in one boy's jar and the teacher asking for the names of some books that might give the group some information about those insects.

Preparing the Children for this Program

The first month of the year is a time in this classroom when the teacher's perceptions and intuitions are working overtime, not to mention those of the children. The teacher described to me the "measuring and strengthening" that need to be done before the children can be launched on their independent reading in the way I had just seen in the classroom. The teacher works with individuals, sometimes with small collections of children, during this first month, on actual reading skills. Even during this time, free reading is a part of the daily class pattern. The teacher watches the children during these free reading times, to see their approach to print, to pictures, to the various books, to the process of reading itself. Some children will hesitate to take on a book which they really could handle, while others will need a good deal of guidance in finding and choosing a book which is "right" for them.

"Each child needs experience in all the phases of this thing," the teacher went on, talking of the first month of each year. "They need to

get used to the idea of personal selection, the student checking system, the recording of the books. It is a matter of a child's getting onto his actual responsibilities and the purposes they serve." Part of this responsibility, evidently, is that a child is to list, as he reads, words he cannot "get" phonetically or through what he sees in the pictures that accompany the words or the context of words themselves. "This helps a child to venture without fear into the books. There's no feeling that he can't handle a book at all just because he runs into words he doesn't recognize." During this month, the children have plenty of exposure to books of a great variety of size, shape, subject and difficulty. And as he becomes at home with these, it is a simple matter to develop the idea of what the checking involves: "Each child works through the checking procedure—he sees how it works—some questioning on the story itself, following up his own vocabulary notes plus some vocabulary questions I raise, and reasonably fluent reading aloud. Only after this process does he put the book on his reading record."

Checking

I had seen the checking system in action, but I wondered how the teacher kept in touch with all the reading that was going on and with the work of the student checkers. I asked about this. "The bottleneck you get into on this checking business can be a real problem," the teacher answered, "and having student checkers is a tremendous help. More important, it is part of this responsibility-for-learning idea which I think we are very slow to encourage in students of any age. In this arrangement, the first child to complete a book becomes 'the official checker' of that book, following his session with me just after he has read it. The teacher needs to be pretty sure this child has a good understanding of the book and that he will be reasonably conscientious in his work with the other children who come to him. The 'official checker' follows my own approach, and has a list of questions about the book to go on, along with some key vocabulary words. Yet he is thrown on his own initiative too, in talking about the book, sometimes in answering questions, sometimes in getting some pressure from the child he is checking on just who got the most out of this book!" Even with this student checking plan, the teacher will usually make a quick final check of her own: "I'll simply ask a leading question or two, usually an interpretive question rather than a factual one—and then ask the child to read a few phrases aloud. This way I can get a picture of the job the checker is doing and at the same time let the child get a sense of the teacher's interest and approval in the job he is doing."

A Demonstration of Virtuosity or a Usable Program?

We have found in a number of the studies carried on by the Committee on Educational Practices of the NCIS that we were describing virtuoso teaching while presenting a program for other schools for their own adaptation and use. There is no reason to believe that a virtuoso teacher is so highly idiosyncratic that what he does has no meaning for other teachers with different styles and temperaments. The class I saw seemed to me to offer a good case for an individual reading program which challenged a roomful of second graders to take on a good deal of their own education. It looked simpler and more natural than most teachers would find it when they tried out such an approach. But that is no reason not to try this sort of teaching with children of all abilities. One returns to the education of the individual, with an arrangement in which, as the teacher said, "no child needs to wait for another child, no child competes with another child, and no child is on exhibition in class."

The principal's support of this program seemed based on a number of outcomes she found especially valuable. "It is important in uncovering the gifted child and it is valuable in aiding us to help the slow child —or the bright child who has reading problems. And it certainly develops a foundation in reading, a real love of reading as well as skill in reading. This teacher has been developing this program for fifteen years, and the impact on the second graders, and the resulting performance in the later years, are things that speak for themselves. I see outgrowths of the program too in the kind of writing the children do in second grade and later—the kind of things they choose to write about, the great range of interests—the things they *know about* through their reading and exploring. I guess it adds up to a compelling way of acting out something I believe strongly: that we should teach with books as support to our teaching, rather than just buy books and have the teaching support *them.*"

Such an approach does not demand special grouping of slow, middle, and bright children. In one sense, *any* collection of children, from two on up, is heterogeneous in so many important ways, even if each child in the collection happens to have the same IQ score. The approach described here makes sense in any kind of grouping, and the Cabot School's range and variety of abilities and interests in this heterogeneously grouped second grade provide some impressive evidences for what is possible in individual education in the classroom.

PART V

A SCHOOL EXPLORES THE MEANING OF "GIFTED"

In 1956 a productive and challenging meeting of experts in the education of gifted children began the reorganization of the City and Country School into an elementary school for gifted children.[1] The people who at that time converged on Bloomfield Hills, Michigan, came to review the picture on gifted child education and to design a program for the "new" City and Country School to carry out. The summary[2] of the proceedings of this Institute[3] makes lively and challenging reading. Today, six years later, as lively and challenging is the school's developing experience in giving life to the recommendations. The school is committed to work with very bright children and to study some important questions which the "separate" education of such children raises. The headmaster spoke to me vigorously on the subject of a full-time program in which gifted children learn together: "You cannot compartmentalize giftedness for just a half an hour a day. You can't just say the gifted will have twenty extra minutes in the library every day, or the gifted will meet once a week for an hour with the reading teacher. These children have to have an intensive, sustained program. They work all day with a rich vocabulary, with a real depth of learning and thinking. You can't limit this depth work to one subject or to part of the day or to a special room."

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[1]City and Country School, Bloomfield Hills, Michigan, George A. Roeper, Headmaster. A co-educational day school, nursery-kindergarten through grade eight, 147 boys, 93 girls. Faculty: full-time 19, part-time 8.

[2]The 30-page summary of the proceedings of the Gifted Child Institute, City and Country School of Bloomfield Hills, June 18 - 22, 1956 is available on request from the school.

[3]Members of the Institute were: Dr. A. Harry Passow, Institute Chairman, Director of the New York Talented Youth Project from the Horace Mann Lincoln Institute for School Experimentation; Dr. Robert De Haan, Chairman, Department of Psychology, Hope College; Dr. Miriam Goldberg, Research Associate from the Horace Mann Lincoln Institute; Dr. Anton Brenner from the Research Staff of Merrill Palmer School of Detroit; Dr. Marie Skodak, Head of the Psychological Services, Dearborn, Michigan, Public Schools; Dr. Elizabeth Drews, Assoc. Prof. at Michigan State University and member of the Gifted Child Committee of the Michigan State Univ.; and Miss Marie Spottswood, long-time Director of the Fieldston Lower School in New York; Mr. and Mrs. George Roeper, Headmaster and Headmistress of City and Country School. Staff members of the school also attended some of the sessions of the Institute.

Eligibility

For admission to the school, a child needs to have an IQ of 130 and/or some special talents in areas beyond words and numbers. Imaginative work in music or art, for example, could make a child a desirable candidate with or without the 130 IQ, though he should probably have a 110 or 115 individual intelligence test score. There are no restrictions because of race, nationality, economic background, or religious creed. Naturally, there is real difficulty in judging the talents of children of nursery school age. Thus there has to be a good deal of elasticity in the admissions procedures for children this young.

The school's experience over the last five years has strengthened the conviction that the IQ can be only one of a number of criteria which need to be considered in seeking a student body for the school. Motivation, capacity for employing personal resources, actual achievement, evidence of originality and thinking ability, all these are explored and taken seriously in admissions. The school's psychologist gives candidates a number of tests, previous teachers write observations of the candidate, parents fill out extensive questionnaires, and school people meet with parents and prospective students. From the picture these experiences and data create, the school can discern a good deal about a child's potential. "Detroit has no service for this kind of thing—for parents who want to find out something about the potential of their children," the headmaster explained. "The only real service made available in the city has to do with problem children or handicapped children. We provide this testing service for interested parents—and we do it for a great many more children than simply our own applicants. We now find that we can select one out of five to ten qualified applicants for the school."

Teachers

With the school committed to a program for gifted children, there needs to be some special focus and emphasis for teachers on the ways gifted children think, work, play, create, and grow. The school is attempting to give this focus and emphasis by a number of means. Dr. Elizabeth Drews, Associate Professor at Michigan State University, has been conducting seminars for the faculty during the first three years, dealing with up-to-date research in gifted child education. For two years, Dr. Drews paid weekly visits to classes and followed these with individual consultations with teachers and a weekly seminar with the faculty as a whole. To widen teachers' perspective, the school has arranged whole-faculty visits to other schools and school systems. Last year all

the teachers of the grades visited the Chicago University Laboratory School and later visited Toronto, Canada, to watch the teaching of gifted children there and to meet with teachers. The public school program for the gifted in Cleveland is another all-faculty project for study and visiting.

"It's a continuous educational program for teachers, with a child psychology orientation," the headmaster explained. "The special seminars we have for teachers are regularly scheduled. It is no hit-or-miss affair. This year the seminar program is divided into three major blocks —a curriculum-content series, a child psychology series, and a program of outside speakers."

He stressed the importance of having teachers understand what was going on in the various academic disciplines in the school: "We have meetings for all the teachers in the five separate academic areas—social studies, mathematics, science, English language arts, and foreign languages. An upper school teacher leads the session on a given subject and reviews the recent literature on developments in teaching that subject. Then he or she gives a personal picture of an approach to the subject and other teachers of the subject join in, but the discussion is carried on by the whole faculty. In this way we don't lose teachers in some special corner of their own."

Along with these experiences, each teacher has a regularly scheduled series of individual conferences with the head of the school. "Sometimes these have to do with a teacher's questions about actual classroom problems. Other times a teacher will want to talk over things that have come up in the seminars or the school visits. Sometimes I will have observed a teacher and want to hear about a project he is doing or an approach he is using. These conferences are certainly valuable to me and I believe they are for the teacher too. Since the conferences are scheduled, we don't fall into the trap of having the head meet individual teachers only in a chance conversation or when there is a crisis or a complaint. Many things come out in a personal conference that do not come out in a faculty discussion. These sessions take much time but I am convinced they are more than worth it."

The Basic Program

The school's program falls into three sections. The first deals with the basic skills: reading, mathematics and writing. These skills are each studied in a separate block of time but are also "integrated" with other subjects and activities. The headmaster commented, "These basic skills don't just develop, regardless, with gifted children. With some real

intensive focus, most third grade children read at adult levels. Real achievement in these basic skills is certainly crucial for advancement into other areas of learning in the present and future of these children."

The second section includes the children's encounter with a great variety of experiences with and beyond basic skills. From nursery on, children have many experiences in music, dramatics, art, dance, science, and shop. Beginning with the second grade the school offers Spanish and French.

The third section includes stimulation and encouragement of special talents and interests of individual children, outside of the regular class program. Such experiences may be in individual work along the lines of a child's own talents or interest. They may be in clubs and activities involving art, music, dramatics, dance, shop, creative writing, science, mathematics, various aspects of world history and current events. These activities and clubs include children from different classrooms and different ages.

The school defines in this way its emphasis on "learning skills:"

> ". . . The use of the dictionary, the encyclopedia, the library, work in outlining and organizing, projects of the problem-solving type. There is stress on discussion skills which include effective speaking and listening and the application of abstract and critical thinking, conceptualizing, summarizing, and using facts and information as a means for interpreting and understanding the past, the present and the future."

"Critical Thinking," A Philosophy and a Program

From nursery on, the school places emphasis on critical thinking as a conscious approach toward careful, exact, and judicious conclusions. Like so many terms in education, "critical thinking" is something people think is fine but tend to define in different ways or leave undefined in puzzling ways. A first grade teacher at this school has written an interesting article about her work with the children in this area of "critical thinking."[1] "Critical thinking" as it applies to her work with her children, means, she says, ". . . the ability to think and to reason, whether it be a child experiencing reading readiness or a student in a higher learning situation. It means becoming familiar with the procedure in inquiring and discovering, developing skill and securing information, resolving the information gathered and then appraising the evidence obtained. It means also the ability to listen effectively and retain and apply what one hears. . . ." An outline of aims which, this

[1]Josephine Shotka, "Critical Thinking In The First Grade", *Childhood Education*, May, 1960.

teacher states, makes sense in her work with her children, is stated here:

1. See and state a problem.
2. Recognize what can be taken for granted.
3. Assume what is true for the sake of testing.
4. Give reasons for testing.
5. Get evidence: reading (by teacher); looking about us for answers; talking to parents and people in a position to help us; using pictures; experimenting (i.e. in science, numbers); seeing films.
6. Evaluate the evidence by: finding bias, validity, reliability.
7. Put findings together and organize them.
8. Draw conclusions.

The teacher writes, "We can encourage the child to express ideas in general terms as well as in concrete terms. . . . We can encourage the child to give a reason for the idea he expresses. The child who learns to ask 'what' or answer 'why' will reach a higher level of mental growth."

As a sample of how this works out in the first grade, the teacher describes in the article an illustration of the "critical thinking" program recently carried on in her first grade class on "The Home and the Community." The article's detailed description of the children's comments, activities and process of developing the unit with the teacher are well worth an interested reader's follow-up.

A Look Around The School

A walk through and around the school gave me a sense of there being active, vigorous, lively work and play going on. I looked into a first grade room and saw students fascinatedly handling ten-color Cuisenaire rods. I saw striking student-drawn or student-painted pictures on the wall and little stories the artists had written posted underneath each picture. The teacher explained to me, "These children have been working on the *concepts* of a composition—the idea of setting up a beginning, telling something, and making an ending. The story is in the picture." She pointed to one picture and story about a dinosaur, another about a tree, another about a trip to the moon. The headmaster added, "They are dealing with the actual language skills in this composition work. We teach a form of grammar in the first grade and give the students a picture of what a sentence consists of." I also noticed an abacus in the room for counting off units, tens, and hundreds.

In a kindergarten room I saw a number of students reading. A teacher commented, "A number of these students are already good readers. They're eager to study natural phenomena. That's what you

see them doing, whether it's bringing in bird's nests or chickens or reading about them."

I saw a nursery playroom for three-year-olds with the children helping pull out the cots for naps. The three-year-old group is not part of the gifted program, which actually begins with the kindergarten, yet the activities in the three and four-year old program are a good beginning for the later program. The teacher spoke of the importance of space for special, private activities in a room like this. I saw private nooks, corners, and spaces for activities that could engage one or two children: fish to feed and look at, reading corners, miniature jungle gyms, kitchen utensils and tiny furniture for house play, little museums of treasures the children had brought in, a whole range of puzzles and games, space and materials for drawing and painting.

From there I walked directly into the room of the four-year-olds and saw the same kind of subdivisions with even more activities: a nook for nature study, a nook for workbench and supplies, a little corner hung with pictures of "things that are alive" and another with pictures of "things that are not alive" all carefully labeled, a nook for a whole variety of toys. A teacher explained, "We're not trying to stuff these children with knowledge. We try to be guided by what they can do, by what they seem to be reaching toward. They have such eagerness for learning! Even big words seem to enchant them. They want to know more and more and more."

I crossed over to an attached room and looked around while four-year-olds were working quietly at tables. I saw pictures on the wall with notes under them about "Johnny's parents' trip to California," "the week Peter went to Mississippi," trips to Florida, New York, Washington, a boy's Saturday butterfly trip, a girl's climb up a mountain with her father. Interspersed were some remarkable maps done by the children. Many of the pictures and maps were done with an effect of three dimensions. Paper and cotton were cut and arranged on top of the drawings or the maps so that the final creation could actually be touched and felt.

I saw hexagonal classrooms with little adjoining workrooms where committees of students were reading or working or carrying on lively discussions with or without a teacher. The main rooms were separated from attached work rooms by glass so the teacher could see into the workroom and supervise the goings-on in there and still keep her class work moving. A geography lesson was on in one room where I stayed a bit, with children asking a "student expert" questions about Peru.

Since departmentalization by subjects is introduced from fifth grade on, there were special rooms for certain subjects, again with work-rooms

and libraries adjoining. I saw the English room just as the walls were being folded away to "join" with the social studies room and as the windows were being darkened for a film. I saw a group of students run into the mathematics room during lunch and take a number of sheets out of a little box which was labeled "take one." I leafed through a random collection of mathematical problems of the most brain-teasing type. I saw sixth graders making toys and blocks for the nursery and kindergarten children to do their number play with. This was a beginning of the new mathematics work for the little children and the sixth graders knew this and were in on the adventure. These sixth graders also had made the drawing boards and T-squares that were in use in this room. I walked back through the laboratory with a kind of biology ante-room to it and a storeroom for microscopes, slides, etc., and saw about twenty-two children in action in the class. Throughout this tour I saw children in action, not children being talked to. Very important, there seemed to be an endless variety of materials, pictures, stories, pieces of treasure from home or from outside—materials of learning in abundance on walls, on shelves, on the tables and desks, in the hands of students.

Social Aspects of Gifted Child Education

"The school is dealing with children from the upper 2% of the child population in intelligence," the headmaster explained. "That fact tells us something about the individual child here and his role in society. There is little talk in the school about 'gifted children' and yet we believe there needs to be some guidance about the whole matter of giftedness in a school like this." A good deal of "guidance program" has to be oblique, done by implication. The school's stress on citizenship, on manners, on interest in the other fellow's creations, are aspects of this guidance. A more direct approach is in the headmaster's human relations course: "I try to meet with each class during the school year in a series of sessions," the headmaster explained, "and we try to get at such questions as 'What concept do the students have of themselves?' I think gifted students don't want to appear different. The gifted child has the same fears, worries and concerns about courage and cowardice and all the rest of it, as other children do."

I asked about the kind of discussions or activities that went on in these human relations classes. "There is a good deal of discussion of values. We work from actual stories. Sometimes I provide the stories and now, more and more, the students are writing the stories. The discussions of these are very interesting. Last week a seventh grader

made up a story about being obedient and being humane—it was quite simple but it provoked a good deal of thoughtful searching on the part of these children. The story is about a boy who lives on a farm, has no friends, and loves to explore. He finally gets permission from his parents to go into the woods, but there is a thicket inside the woods that he is warned never to enter. He hears a baby bear howling and he wanders through the woods and finds that the baby bear is caught in the thicket. The question is, 'What should be do — should he disobey his parents' instructions never to go into the thicket and respond to his own desire to help the bear?' Again, the variety of feelings and experiences that the students bring to these discussions is extraordinarily interesting — so are the conclusions they try to make or the conclusions they refuse to make."

The headmaster spoke of a plan to assemble some of these stories and notes on sample comments, opinions and responses to share with schools and classes in other countries. "It would be extremely interesting for these children to be able to discuss with foreign children one of these little stories and then have a description from a Japanese school, or a Russian school, on what children in those schools thought about what was the right thing to do as a next step beyond the same story. I think it will be interesting to see the different concepts of obedience, of rights of ownership, of responsibility, etc."

This kind of discussion, and the status given to it by having the headmaster conduct it, may well be a telling indirect lesson on perspective for these children. Evidently the discussion of values involved in the little stories is deeply felt by the students, judging by their response. At the same time these values have to do with a good deal more than intellectual accomplishment and creative achievement. They show issues of human relations all children have to face, regardless of intelligence. And the idea can be impressed on the gifted that these problems are alike for all children. Yet there is evidently a real challenge in the way these sessions are approached so that the imagination and creativity of different children are brought to bear on human situations and experiences.

Certain Findings From The School's Work With Gifted Children

A report from the school describes certain conclusions, at this point in its history, about the experience of the last five years in which the school has dealt exclusively with very able children:

> "Grouping high ability children is efficient for learning and teaching. Teachers need to elaborate less in explaining

> subject matter, to repeat less in achieving assimilation of content. Children are able to teach themselves considerable amounts of subject matter. Children in homogeneous classes with an IQ of 130 and above can cover a given amount of subject matter in one-third of the time that is needed for the average child. Kindergarten children, and in some instances even younger children, are ready for a regular first grade reading program. First grade children can learn at least six times as many new words as are ordinarily required in first grade. First grade gifted children need considerably less repetitive exposure to add new words to their vocabularies. One may describe as the most significant aspect of performance of gifted children their ability to express verbally and interpret complex and abstract matters in science, mathematics, poetry, prose, etc. This ability is apparent every moment of the day in the way the children converse with each other and carry on discussions with the teachers. . . ."

These are more statements on "where we stand now" than rigid conclusions. There are a number of questions the school is raising, and its search for evidence seems to be a stimulating adventure for teachers and students. For example, the headmaster spoke of his interest in this question: "What does the interaction among gifted students do to their intellectual growth?" He added, "I would say it is conducive to their development. We're trying to develop some tests to explore this question."

Another question which interests the school and which is challenging it to further searching is this: "What kinds of competition are important, stimulating, and—psychologically speaking—healthy?" The headmaster commented on this one: "We don't emphasize competition here. There seems to us little point in measuring the 130 IQ child and the 180 IQ child by the same standard. We believe in evaluating the individual child in terms of his own ability. We do have competition stressed in areas where it seems to make sense: sports, manners, behavior, citizenship. But what kinds of competition are healthy and stimulating and what kinds are deadening and restricting are things which need study, particularly when there is so much talk nowadays about the 'value' of competition for grades in academic performance."

Another question to which the school is turning its attention is this: "To what degree does intelligence contribute to development of the ego—to development of traits of personality relating to self confidence and inner security?"

Now, with the school firmly established and converted to its new task, the faculty is all the more involved in discussion of gifted child education with colleagues of other educational institutions. An example

of this is the recent (March 1962) new Institute on Gifted Children. The Institute was held at the City and Country School, with the theme, "Psychology and Curriculum: Theory and Application." The school's contribution in raising and exploring crucial questions and in trying out its answers to them is, it seems to us, one for which the whole educational community can well be grateful.